URBANISM, ART, AND ECONOMY: THE MARBLE QUARRYING INDUSTRIES OF APHRODISIAS AND ROMAN ASIA MINOR

by

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ABSTRACT

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This dissertation examines the quarrying industries of Roman Asia Minor, and highlights the activities of private individuals, institutions, and municipalities and the connections between the exploitation of marble resources, local artisanal traditions, and exchange markets within the region. Case studies focusing on the exporting quarries of Dokimeion and the cities of Aphrodisias, Ephesus, Pisidian Antioch, Sagalassos, and Sardis illuminate quarry output, the networks in which craftsmen circulated, and consumption practices. Drawing together evidence from archaeological excavations and regional surveys, literary and epigraphic sources, theories of landscape and the economy,

geology, and scientific analysis, I contextualize quarries into their wider social and economic landscapes.

An investigation of the newly discovered marble quarries found during the Aphrodisias Regional Survey and results of geochemical analyses provides important evidence both for the exploitation of marble on a wider scale than previously known, and for the limited role played by Aphrodisian marble – as opposed to Aphrodisian sculptors – in the international art market. At Aphrodisias, as elsewhere, new quarries were opened because cities were not able to extract marble quickly enough to supply demands of urbanization; this demand was so high that it remained profitable to bring in marble from further afield. Local landowners, municipalities, and artisans produced and sold marble in competitive local markets.

Written sources suggest that quarries were owned and operated at different times by private individuals, sanctuaries, and the state. My research suggests that only the state could afford to offset the cost of supplying marbles regionally and internationally and that participation in the marble trade was deeply embedded in the urban fabric of Asia Minor. Benefactors of civic monuments tapped into prestigious trade networks mainly associated with imperial architecture in Rome, since their display conveyed notions of access and status most vividly. The greatest asset of the resources located in territories of marble-rich cities was the opportunity for civic beautification on a local level. Yet the cultivation of an exceptional architectural and sculptural carving-tradition fostered conditions for social mobility for select sculptors whose skills allowed them to begin on projects in local quarry or city workshops, and embark on international careers.

CHAPTER 1

INTRODUCTION

Suetonius says that Augustus boasted he found Rome a city of brick and left it a city of marble.[1] With the help of imperial functionaries, the Roman Emperors took possession of and exploited a number of marble quarries across the Mediterranean to monumentalize their capital. The ostentatious display of expensive marbles in public buildings came to symbolize the *imperium* of the Roman Empire. The province of Asia Minor was one of the richest sources for marble; well over half of the quarries run by the state were located there. Yet in Asia Minor, the tradition of quarrying marble on a large-scale had begun centuries before Roman rule within the context of Greek city-states. The first monumental marble buildings, such as the Temple of Artemis at Ephesus and Temple of Apollo at Didyma, were connected to the patronage of the Lydian kingdom. By the Hellenistic period, Seleucid and Attalid kings and the aristocratic elite had undertaken major building projects in various cities along the Aegean coast. These

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[1] Suetonius, Live of the Caesars, Augustus, 28. The ancient definition of marble included breccias, granites, porphyries, diorites, basalts, and finer quality limestones. Throughout this study, I will refer both to the Latin and Italian names of marbles. Ancient sources mention the names of the most popular marbles, which were usually named after either their geographic origin, or less commonly, their owner. These sources include Pliny's Natural History Book 26, Strabo's Geography, and Diocletian's Edict on Maximum Prices. The Italian names were coined by Italian stone craftsmen, working in the Renaissance and Baroque periods, and like the Latin terms, are descriptions of the physical characteristics of the marble.

regional urban centers developed extensive, yet self-contained systems for obtaining building materials. As the *Pax Romana* ushered in an era of stability and prosperity in Asia Minor, the pace of urbanization accelerated. Monumentalization spread from the coast to the interior and nearly every city could claim a theater, bath, or fountain as an amenity for its citizens. In the Roman period, public building continued to rely on the patronage of wealthy, local elites, who strove to project themselves favorably to their fellow citizens and to the ruling powers, and to outdo other regional cities in order to bring prosperity and opportunity for themselves and their cities. This impulse to build created a demand for building materials and a number of new marble quarries were opened in the territories of local cities. Civic benefactors funded craftsmen, who continued the carving traditions learned in the Hellenistic period, to construct marble cities of grand colonnaded buildings adorned with sculptures. This "marble style" was fundamental to East Greek provincial self-definition under Roman rule and played an important role in the economies of local cities. To meet the demand for materials, traditions of fine carving grew around international production centers and cities; and sculptors and their materials circulated widely in both regional and international networks.

Cities exploited the rich and varied sources in their rural territories, and imported prestigious marbles in interesting ways that have not yet been fully documented or realized. This dissertation highlights the activities of private individuals, institutions, and municipalities and the connections between the exploitation of marble resources, local artisanal traditions, and exchange markets within Asia Minor. It asks whether cities used their territorial marble resources largely for civic adornment, or also for trade. Was profit was restricted to the local craftsmen and entrepreneurs engaged in production, or did

cities as a whole benefit from the export of their marble? Drawing together evidence from archaeological excavations and regional surveys, literary and epigraphic sources, theories of landscape and the economy, geology, and scientific analysis, I contextualize quarries in their wider social and economic landscapes.

Specifically, my data is drawn from an archaeological survey conducted from 2005-2009 under the aegis of New York University and the University of Michigan around the Hellenistic-Roman city of Aphrodisias, in Caria; this survey allowed for a detailed investigation of the marble quarries located within the single region of Aphrodisias, a place at the heart of debates on marble production in the Roman world. Fifty years of continuous excavations by New York University have revealed an unusually well-preserved city that exemplifies the marble culture of Roman Asia Minor. Abundant and high quality marble resources were located close to the city and the major civic monuments were nearly entirely built out of marble. Aphrodisias was an important center for the production of sculpture and was known in antiquity for its expert sculptors; hundreds of sculptures depicting local aristocrats, heroes, philosophers, Roman emperors, and mythological scenes have been excavated at the site, and approximately 40 sculptures signed by Aphrodisian craftsmen have been found scattered widely throughout the Mediterranean. The proximity of the quarries to Aphrodisias, the epigraphic and archaeological evidence for the local sculptural tradition, and the preservation of the city's marble architecture have led scholars to assign to these quarries and the marble industry a prominent role in the history of the city. Moreover, scholars have long assumed that Aphrodisian sculptors transported their local materials as they traveled abroad and that Aphrodisian marble was widely used on the international trade market.

This dissertation investigates the quarrying industries in the province that was the Roman Empire's richest source of marble to shed new light on an important aspect of economic behavior in the ancient world. Many different strata of society were involved in the marble quarrying industries, – from the rural landowner, the slave who labored in the quarries, the artisan who carved a statue, the owner of a marble workshop, the architect who designed a building, the on-site supervisor of construction, the hired workers and contractors, the patron who ordered the commission, the tradesmen selling marble revetment, to the ordinary citizen who experienced the visual message of a monument – and these populations are all aspects of this study. Understanding the new material from Aphrodisias requires undertaking a comparative study of other archaeological sites in the region to frame the city within its wider social, economic, and political narratives. Therefore, this study draws on original research detailing the patterns of resource exploitation and consumption not only in Aphrodisias, but also in Ephesus, Sardis, Sagalassos, and Pisidian Antioch (Fig. 1.1). At its most basic level, this study links rural, industrial quarry sites to their urban cores, and asks what observable patterns of quarry landscapes can tell us about local enterprises. Yet the comparative approach I employ opens the scale of inquiry from the town to the province, illuminating networks of production, exchange, and consumption on a regional-level. As such, it allows us to assess the degree to which local economies were autonomous or were subject to the mandates and exploitation of Roman domination, to see how these different spheres interacted, and to understand the ideologies behind the quest for new marble sources. The subject also touches on topics that are fundamental to Roman art and architecture. Did the export of Anatolian marbles and Anatolian sculptors always go hand in hand and

what was the contribution of Aphrodisian sculptors relative to that of other marble-rich sites in Asia Minor? An investigation on the mobility of materials and migrant craftsmen points towards future research avenues, and helps us to see how the artisans, trained in Hellenistic traditions and credited with an enormous impact upon art and architecture in Rome and across the empire, operated in networks closer to home.

ORGANIZATION OF THE DISSERTATION

Chapter two provides a review of the literature of stone-exploitation within Asia Minor, and helps to situate the contributions my dissertation makes to the field. The second half of the chapter contextualizes the marble quarrying industries within the economic and artistic frameworks of the Roman Empire; I address geological availability of marble resources, patterns of land ownership, the labor involved in marble quarrying industries, production and trade, and the values that Greco-Roman society attached to marble. In this chapter, I rely heavily on literary and epigraphic sources to document private entrepreneurship and the local exchange markets that emerge in the course of presenting individual cases studies. Chapter three is the crux of the dissertation. It incorporates the results of a survey of ancient marble quarries discovered in the territory of Aphrodisias and examines the role that marble played in the social and economic life of the city in light of the new evidence from the survey, recent advances made in marble scientific provenancing, and archaeological evidence from within the city. This project was interdisciplinary in nature, combining archaeological and gelogical documentation, along with chemical analysis of the quarries; Carola Stearns, research associate of the

Kelsey Museum of Archaeology at the University of Michigan, carried out the geological investigation. The chapter also presents the results of isotopic analysis, performed on the samples collected from the Aphrodisias quarries. Taken together, the various pieces of evidence suggest a limited role for Aphrodisian marble – as opposed to Aphrodisian sculptors – in the international art market. Estimates of marble extracted from all the regional quarries as compared to estimates of marble used in the major civic monuments, comparisons between the size of the regional quarries and the massive enterprises of the known exporting quarries of antiquity, and the rate of sculptural production and number of artisans active in the city workshops suggest that Aphrodisian marble was used primarily for the monumentalization of its urban center rather than for supplying an export market.

Chapters four, five and six examine other locales within Asia Minor as less-detailed case studies, and focus on a state-run quarry, two large Aegean coastal centers with locally-available marble resources, and two small marble-poor inland cities. I consider the exchange and consumption of various marbles in terms their specific use within individual monuments, the differential occurrence between cities, and their overall distribution. To begin the comparative section, chapter four presents an overview of the major Anatolian quarries known to have fed the international market for marble. I summarize previous work on the famous, exporting quarry at Dokimeion and examine the feasibility of the models currently in favor that emphasize the Roman state's monopolization of the quarry through an investigation of its physical topography, and the archaeological and epigraphic evidence for the production and distribution of its goods - with the aim of assessing the scale and impact of the trade in Dokimeion marbles.

Through a re-evaluation of scholarship, it is clear that Dokimeion marbles and sculptors were invested not only in imperial commissions, but also in local and regional work. Chapter five focuses on the consumption of stone in two marble-rich cities (Ephesus and Sardis) and chapter six considers the importing practices of two marble-poor cities (Sagalassos and Pisidian Antioch). By investigating marble use in the civic adornment of provincial towns in Asia Minor, it is possible to generalize about the extent to which these cities were self-sufficient in building materials, whether marble-rich cities profited from the export of their own local marbles, and how deeply embedded the international marble trade was in the urban fabric of provincial cities in Asia Minor.

I argue that the marble resources located in the territory of marble-rich cities largely served local needs, and that the patterns of quarries dotting the countryside provide evidence for a competitive local market in marble. Local landowners exploited their land, and temples and municipalities leased out their land to small-scale entrepreneurs with the intent to profit from their extraction and sale. Long-standing marble-carving traditions, a large workforce, a wealthy population, and advantageous geographic and geopolitical position allowed Ephesus and Sardis to participate in the international marble trade, largely as consumers, and occasionally as suppliers. In contrast to the purely luxury-driven marble trade in marble-rich cities, I argue that importation to marble-poor Sagalassos and Pisidian Antioch reflects both need and extravagance. In order for local elites in remote, interior cities to compete on a regional-level with the cities, which benefited from abundant sources of marble that created the framework for the "marble style," marble-poor cities had to import goods that could not be translated in locally-available materials. As a conclusion to the dissertation, chapter

seven offers a synthesis of marble production, distribution, and consumption discussed in the preceding chapters. The marble quarrying industries of Aphrodisias and the selected comparative sites are presented as case studies that contribute to our understanding of the political economy of a region under Roman domination. I argue that the greatest asset of the abundant marble resources in Asia Minor was the opportunity for civic beautification on a local level. Cities relied primarily on the exploitation of local marbles for civic adornment, and imported colored sources, made fashionable by imperial tastemakers, to display their wealth and status.

CHAPTER 2

HISTORICAL CONTEXT AND METHODOLOGICAL APPROACHES

MARBLE QUARRIES IN SCHOLARSHIP

In Anatolia: Land, Men, and Gods in Asia Minor, S. Mitchell claims that "few forms of economic activity could have been more important than the marble-quarrying which furnished the Roman world with the raw material used for the most extensive and far-reaching building programmes in the history of Antiquity."[2] This statement touches on the main inquiry of research of this dissertation, and is a subject, which has received scholarly attention since the early history of the discipline of classical archaeology.[3] J. Ward-Perkins, inspired by the importation of marble to the Libyan desert city of Lepcis Magna, and with his article in 1951, "Tripolitania and the Marble Trade," pioneered the modern study of ancient quarries and the marble trade, which has subsequently grown into a large field of research.[4]

In Asia Minor, stone-studies have emerged as a central topic of research thanks to a combination of long-standing excavations, regional surveys, and scientific analyses.

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[2] S. Mitchell, Anatolia: Land, Men and Gods in Asia Minor. Vol. 1 (Oxford 1993) 159.
[3] G. Lepsius, Griechische Marmorstudien (Berlin 1890).
[4] J. Ward-Perkins, "Tripolitania and the Marble Trade," Journal of Roman Studies 41 (1951) 89-104.

The "big digs" of Turkey, which have traditionally focused on uncovering monumental architecture, have published numerous monographs on the excavation and architectural analysis of individual buildings, and many of the major buildings constructed of marble have been thoroughly measured, drawn, and reconstructed.[5] Research on the marble sculptures excavated from these buildings is another important aspect of large-scale Greco-Roman excavation research agendas, and detailed analyses of statuary types, displays of marble statuary reconstructed in their original settings, and the socio-political messages conveyed to their viewers have been published in equal measure to, and often as integral parts of architectural histories.[6]

The search for and documentation of ancient quarries began in Asia Minor in the 1970's. J. Röder and M. Waelkens conducted archaeological surveys of the quarries at Dokimeion in Phrygia; N. Asgarı investigated those on the island of Proconnesos in the Propontis; and D. Monna and P. Pensabene catalogued the known marble quarries of

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[5] An abbreviated bibliography includes: J. Reynolds, Aphrodisias and Rome (London 1982); K. Erim, Aphrodisias (New York 1986); C. Roueché, Aphrodisias in Late Antiquity (London 1989); R. Smith, Aphrodisias I. The Monument of C. Julius Zoilos (Mainz 1994); R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006); L. Brody, Aphrodisias III: The Aphrodite of Aphrodisias (Mainz 2007); C. Roueché and K. Erim (eds.), Aphrodisias Papers: Recent Work on Architecture and Sculpture, Journal of Roman Archaeology Supplementary Series 1 (Ann Arbor 1990); R. Smith and K. Erim (eds.), Aphrodisias Papers 2: The Theatre, A Sculptor's Workshop, Philosophers, and Coin Types, JRA Supplementary Series 2 (Ann Arbor 1991); R. Smith and C. Roueché (eds.), Aphrodisias Papers 3: The Setting and Quarries, Mythological and Other Sculptural Decoration, Architectural Development, Portico of Tiberius, and Tetrapylon, JRA Supplementary Series 20 (Ann Arbor 1996); R. Smith and C. Ratté (eds.), Aphrodisias Papers 4: New Research on the City and its Monuments. Journal of Roman Archaeology Supplementary Series 70 (Providence 2008).

[6] A selective bibliography includes: J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1970); J. Inan and E. Rosenbaum, Römische und Frühbyzantinische Porträtplastik aus der Türkei. Neue Funde (Mainz 1979); R. Smith, "The Imperial Reliefs from the Sebasteion at Aphrodisias," Journal of Roman Studies 77 (1987) 88-138; M. Aurenhammer Die Skulpturen von Ephesus (Wien 1990); R. Smith, "Cultural Choice and Political Identity in Honorific Portrait Statues in the Greek East during the Second Century AD," Journal of Roman Studies 88 (1998) 56-93.

Asia Minor in a single volume.[7] While the main sites of extraction have been surveyed and photographed, and the physical topography and the artifacts abandoned at the quarry site thoroughly described, many new quarries in Turkey continued to be found today as a result of the use of regional survey as a method to investigate vast swaths of unexplored archaeological zones. However, only a handful of survey projects in Asia Minor – such as Sagalassos and Hierapolis - assess their broader significance.[8]

Distribution studies now exist on the types of imported marbles used in many buildings of the major cities of the Roman Empire, and as a result local, regional, and international patterns of consumption are slowly coming into clearer focus. Directors of large-scale excavation projects have assigned researchers the task of cataloguing the decorative, colored marbles used in well-documented buildings.[9] Collections of studies on individual cities over large geographical regions have begun to be compiled in single volumes, such as the book Les Roches Décoratives dans l'architecture Antique et du Haut Moyen Âge, which presents 21 case studies in France and across Continental Europe, and M. Fischer's comprehensive work, which evaluates the trade in select cities in the

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[7] J. Röder, "Marmor Phrygium. Die antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 253-312; D. Monna and P. Pensabene, Marmi dell'Asia Minore (Roma 1977); N. Asgarı, "The Roman and Early Byzantine Marble Quarries of Proconnesus," in E. Akurgal (ed.), Proceedings of the 10th International Congress of Classical Archaeology (Ankara 1979) 467-480; M. Waelkens, "Carrières de Marbre en Phrygie," Bulletin des Musees Royaux d'Art et d'Histoire (Brussells 1982) 39-41.

[8] P. Degryse, T. Heldal, E. Bloxam, P. Storemyr, M. Waelkens, E. Trogh, H. Vanhaverbeke, J. Poblome, and P. Muchez, "The Sagalassos Quarry Landscape: Bringing Quarries in Context," QuarryScapes (2007); G. Scardozzi, "Ancient Marble and Alabaster Quarries near Hierapolis in Phrygia (Turkey): New Data from Archaeological Surveys," ASMOSIA IX Conference (Tarragona 2009).

[9] For case studies in Asia Minor, see M. Corremans, P. Degryse, and M. Waelkens, "The Import of Coloured Stone and White Marble for the Interior Wall and Floor Decoration of Public and Domestic Buildings at Sagalassos, Turkey," ASMOSIA IX Conference (Tarragona 2009).

marble-poor province of Roman Palestine, and the catalogue of imported marble found in the cities of Roman Crete.[10]

Underwater archaeologists have discovered numerous shipwrecks on the bottom of the Mediterranean Sea laden with marble, and their work has revealed the ubiquity of marble in maritime trade along with sophisticated technological achievements in ship-building. A database maintained by the Oxford Roman Economy project lists 84 shipwrecks carrying marble cargoes, and Anatolian marbles have been securely identified on board at least 12. In some cases, the ships that the Romans called *nave lapidariae* were purpose-built stone carriers,[11] but commercial vessels could also carry mixed cargoes, and a heavy material like marble served as ballast, stabilizing a ship loaded with lighter goods, such as grain, wine, or olive oil.[12]

Epigraphic sources constitute another important source of information on the Roman marble trade. Diocletian's Edict on Maximum Prices, which refers to the transactions between individual sellers and purchasers, sets a ceiling price for all goods, including marble, to deal with inflation, unemployment, and currency devaluation. The Edict lists the most circulated marbles in 301 A.D, and records both the names and prices of 19 different types of marble.[13] Comparisons between marbles prices show that those

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[10] M. Fischer, Marble Studies: Roman Palestine and the Marble Trade (Konstanz 1998); S. Paton and R. Schneider, "Imperial Splendour in the Province: Imported Marble on Roman Crete," in A. Chaniotis (ed.), From Minoan Farmers to Roman Traders. Sidelights on the Economy of Ancient Crete (Stuttgart 1999); P. Chardron-Picault, J. Lorenz, P. Rat, and G. Sauron, Les Roches Décoratives dans l'Architecture Antique et du Haut Moyen Âge (Oxford 2004).

[11] D. Carlson has argued that the Kizilburun ship off the coast of western Turkey was one such example.

[12] P. Pensabene, "A Cargo of Marble Shipwrecked at Punta Scifo near Crotone (Italy)," International Journal of Nautical Archaeology and Underwater Exploration 7.2 (1978) 105-118.

[13] These Latin names have been reconstructed as: *Porfyritici*, *Lacedaemonii*, *Numidici*, *Lucullei*, *Pyrrhopoecili*, *Claudiani*, *Alabastreni*, *Docimeni*, *Euthudemiani*, *Anacaseni*, *Tripontici*, *Thessalici*, *Carusti*, *Scyri*, *Heracleotici*, *Lesbi*, *Thassi*, *Proconnesi*, and *Potamogalleni*. Several of these types have not been identified. The standard Latin texts are give in S. Lauffer, Diokletians Preisedikt (Berlin 1970); K. Erim

located in inland areas were considerably more expensive than those located on bodies of water. The prices for marble were likely determined by a combination of the quality of the material itself as well as the distance it had to be hauled overland.

An abundance of written evidence in the form of labels carved onto quarry blocks has oriented research toward studies on quarry organization and administration. L. Bruzza's publication of a series of 350 inscribed marble blocks discovered in the marble-yards near the Tibur in Rome sparked an interest in the marble trade and ancient quarries in the late nineteenth century A.D.[14] On the heels of this and other discoveries in Rome, scholars turned their attention to analyzing inscriptions found in a number of ancient quarries. These types of inscriptions have been recorded on blocks originating in the quarries of the Carystos (185), Chemtou (140), Chios (45), Dokimeion (450), Egyptian Eastern Desert (215 on *marmor Claudianum*), Teos (100), and white marbles, including Luna (85), and Paros, Pentelicon, and Proconnesos (50). The body of inscriptions alongside ancient literary sources has become the basis for arguing for imperial expropriation and monopolization of a select number of quarries. In general, the labels record the consular date, the personnel in charge of the quarries, which included a *procurator* (*sub cura procuratoris*), contractors (*ex ratione*), extraction team (*caesura*) and workshop (*officina*), as well as the branch (*bracchio*) and the precise spot (*loco*) from which the block was extracted. Division of labor as it relates to the extraction team will be discussed in further detail under the social context of marble production section in this

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and J. Reynolds, "The Copy of Diocletian's Edict on Maximum Prices from Aphrodisias in Caria," Journal of Roman Studies 60 (1970) 136. M. Crawford and J. Reynolds, "The Aezani Copy of the Price Edict," Zeitschrift für Papyrologie und Epigraphik 34 (1979) 178.

[14] L. Bruzza, "Iscrizioni dei Marmi Grezzi," Annali del'Instituto 42 (1870) 106-204.

chapter, and the various theories describing the personnel involved in overseeing operations will be addressed under the organizational aspects of the Dokimeion quarries in chapter four.

Perhaps the most spectacular advances – and the most promising avenue for understanding the scale and nature of the ancient marble trade - lie in the field of archaeometry where quarry identification and materials analysis have been closely linked since the late 1960's. Field archaeologists and art historians have worked in tandem with geologists and chemists under the umbrella of the professional association of ASMOSIA (the Association for the Study of Marble and Other Stones used In Antiquity) to establish a scientific index of the main marbles exploited in antiquity. By experimenting with a variety of analytical techniques, physical scientists have slowly refined complicated geochemical tests for matching up marble artifacts to marble sources.

Different techniques, combined with stylistic and typological analyses, have proved successful - to varying degrees - in determining quarry sources, trade patterns as well as more art historical applications in detecting forgeries and rejoining broken pieces of sculpture and architectural elements. Forty years ago, in response to C. Renfrew and J. Peacey's petrological study on Aegean marbles, B. Ashmole estimated:

> the chances of any scientific method, present or future, being able to determine with certainty the source of any given specimen, as nil…, and that until science produces something convincing, it is better to trust common sense, and, in identifying marbles, to aim rather at degrees of probability than at unattainable certainty.[15]

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[15] C. Renfrew and J. Peacey, "Aegean Marble: A Petrological Study," Annual of the British School at Athens 63 (1968) 45-66; B. Ashmole, "Aegean Marble: Science and Common Sense," Annual of the British School at Athens 65 (1970) 1-2.

A characterization study, which tries to match raw materials to the original source, has two main pre-requisites: first, all sources must be identified and second, the sources must be distinguishable from one another. Conditions for successful provenancing of white marbles have proved difficult, but not impossible, under these parameters. First, the discovery of ancient quarries is far from complete, as was further confirmed by the eight new quarries discovered during the course of our survey project. No database of marble can, therefore, be regarded as fully comprehensive; archaeologists currently work with a skewed dataset. Secondly, the application of one type of test cannot be a single determinant in distinguishing the most prolific ancient Greek and Roman marble quarries from one another. Problems arise within one type of test, such as isotopic analyses, where a signature can vary widely throughout a single quarry, or a single block. This results in significant overlappings in the major antique white marble quarries.[16] Geologic surveys have shown that marble beds formed in the same geologic age can stretch over hundreds of miles. Certain types of provenancing tests, such as electron paramagnetic resonance spectroscopy, ignore geological formation processes and produce results that show marbles, extracted from hundreds of miles apart, as having the same geochemical signature. Because white marbles have very few impurities, successful distinction between different quarries requires the use of statistical techniques, such as discriminate analysis. Nearly 40 years after Ashmole's dire prediction, it is possible to say that the methods used to discriminate between white marbles have not been successful in securely identifying origin, but rather in eliminating the possibilities of a marble's origin. Since

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[16] K. Germann, G. Holzmann, and F. Winkler "Determination of Marble Provenance: Limits of Isotopic Analysis," Archaeometry 22 (1980) 99-106.

statistical discrimination is the only way to identify the origin of white marbles with success, researchers have created databases for statistical measurement. To date, the chemists and geologists who have developed these databases (one of which has nearly 7,000 entries) have used them for the purpose of identifying the origins of marble samples collected in the field and in museums.

The studies described above have usually been conducted independently of one another; consequently, the strands of evidence remain fragmentary and in many respects, marble studies remains a specialty subject within a sub-field of archaeology. This state stems from an embarrassment of riches. The sheer volume of material presented in T. Broughton's monograph on Roman Asia Minor in T. Frank's Economic Survey of Ancient Rome on the land, its products, trade, and building enterprises, and civic expenditures far exceeded any of the volumes on the other provinces of the Roman world.[17] Specialization has become the norm in coping with the diversity of evidence, and the inherent divisions between experts working on archaeological excavations and surveys, architectural history and ancient art, geology, chemistry, and materials analysis has contributed to the lack of integration of marble studies into the wider currents of archaeological theory and economic history. Whereas ancient historians have plumbed other classes of materials distributed in antiquity – ceramics, coins, grain, olive oil, and wine – for insights into the ancient economy, they tend to pass over the ancient world's most durable and iconic building material.[18] However, there are new research possibilities. For example, scholars of the Roman economy have recently advocated that

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[17] T. Broughton, Roman Asia Minor in T. Frank (ed.), An Economic Survey of Ancient Rome, Vol. IV (Baltimore 1938) 499-918.

[18] In recent volumes on the ancient economy, stone, quarrying, and/or marble are rarely mentioned.

quantitative analysis be applied to trade in the Roman world.[19] Given that databases on marble sources already exist, they could easily be put to use for quantifying trends in the ancient marble trade.

The availability of an immense amount of data makes it an opportune moment to examine in closer detail the commonly-held assumptions surrounding the marble quarrying industries of Roman Asia Minor. Scholarship has tended to follow the technological methods for extraction and transportation,[20] the production and distribution of a single type of commodity, such as a sarcophagus, capital, or column,[21] or the administration of supply as interpreted through inscriptions found on blocks abandoned in the quarries.[22] The studies of marble quarries believed to be state-owned form the bulk of the scholarship, and stress the organization of a centralized system that supplied the imperial building projects in Rome.[23]

In current scholarship, assumptions surrounding marble exploitation fall into two main lines of thought. K. Greene makes the distinction in The Archaeology of the Roman Economy between the use of stone for prestigious official projects, backed up by

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[19] A. Bowman and A. Wilson (eds.), Quantifying the Roman Economy: Methods and Problems (Oxford 2009).
[20] M. Waelkens, "The Quarrying Techniques of the Greek World," in M. True and J. Podany (eds.), Art Historical and Scientific Perspectives on Ancient Sculpture (Malibu 1990).
[21] M. Waelkens, Dokimeion: Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage. Chronologie und Typologie Ihrer Produktion (Berlin 1982); N. Asgarı, "Objects de Marbre Finis, Semi-Finis et Inachevés Proconnèse," in M. Waelkens (ed.), Pierre Eternelle du Nil au Rhin: Carrieres et Prefabrication (Bruxelles 1990).
[22] M. Dubois, Etude sur l'Administration et l'Exploration des Carriéres. Marbres, Porphye, Granit, etc. dans le Monde Romain (Paris 1908); C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy: Production and Distribution in the Roman Empire in the Light of Instrumentum Domesticum. Journal of Roman Archaeology Supplementary Series 6 (Ann Arbor 1993); A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – AD 235 (Oxford 2010).
[23] H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992).

the wealth and organization of the emperor, and the exploitation of local geologic reserves used for ordinary, local building.[24] According to the first view, the export of international marbles was for the exclusive use of imperial architecture in Rome, and the emperor and his agents monopolized the industry in specialty stones and products. This model is largely due to Ward-Perkins' influential idea that modes of production reached an unprecedented level of commercialization as a result of massive urbanization programs in Rome. The enormous demand for materials led to a rationalization of the supply to maximize the efficiency of marble production in the state-owned quarries. Quarries began to produce items in bulk, oftentimes in standard sizes; certain quarries began to specialize in the production of certain goods; items were stockpiled in the quarries and marble-yards of emporium cities; craftsmen were available for hire through overseas agencies; and these agencies oversaw and administered the production and distribution in the major exporting quarries.[25] The system was fully operational in Rome by the mid-first century A.D., and by the early second century A.D. was opened up to any city or individual who could afford to buy these expensive marbles. Research on non-imperial quarries typically assumes that quarries used in local civic building were "peri-urban," and therefore locked into supplying the closest town.[26]

While these models are for the most part accurate, the value of a survey such as this reveals the complexities behind the generalizations. In fact, most quarrying in Asia Minor, and across the empire, was conducted by municipalities, institutions, or private individuals, who owned or inherited the valuable land from which the stone was extracted.

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[24] K. Greene, The Archaeology of the Roman Economy (Berkeley 1986) 149-150.
[25] J. Ward-Perkins, "Nicomedia and the Marble Trade," Journal of Roman Studies 41 (1951) 89-104.
[26] R. Bedon, Les Carrières et les Carriers de la Gaule Romaine (Paris 1984).

This reality has largely been overlooked because countless quarries yield no clues about ownership since the written record is a blank. Recent scientific advances in sourcing marble and in distribution studies in the provinces attest a healthy trade operating outside the imperial sphere, and relatively-unknown marbles, associated with cities, could be also traded.[27] Throughout the course of this study, it will become apparent that internationally-exported marbles were widely used in non-imperial settings, and while perhaps not common-place, were not as exceptional as generally assumed.[28]

Owners of marble quarries were in an advantageous position to profit from their enterprises. Yet literary and epigraphic sources present a mixed picture of the scale and financial benefits of quarrying. Pliny alludes to an enormous market for marble and highly trained artisans in Book 36 (On the Nature of Stones) in the Natural History, when he says that "the reputation of (famous marble sculptors), distinguished as though their work may be, has been obscured by the number of artists engaged with them on a single task, because no individual monopolizes the credit," and that "it is not easy to list the (kinds of marbles) when they are so numerous. For there are few places for which a characteristic marble is not found to exist."[29] While discussions about land ownership in epigraphic and literary sources attest an interest in the profits made from private

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[27] For a shipwreck carrying sarcophagi made of the local, volcanic stone of Assos, see H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 56-60; for the exportation of capitals carved in Ephesian marble to Perge, see J. Herrmann and R. Tykot, "Some Products from the Dokimeion Quarries: Craters, Tables, Capitals, and Statues," in Y. Maniatis (ed.), ASMOSIA VII (2009) 59-75; for the alabaster quarries around Hierapolis that surely exceeded local consumption, see M. Çolak and L. Lazzarini, "Quarries and Characterisation of a hitherto Unknown Alabaster and Marble from Thyatira (Akhisar, Turkey)," ASMOSIA VI (Venice 2000) 35-40 and G. Scardozzi, "Ancient Marble and Alabaster Quarries near Hierapolis in Phrygia (Turkey): New Data from Archaeological Surveys," ASMOSIA IX (Tarragona 2009). I observed decorative alabaster during my investigation of the monuments in Hierapolis, Sardis, Ephesus, and Sagalassos that appears to have originated in these quarries.

[28] K. Greene, Archaeology of the Roman Empire (Berkeley 1986) 149-150.

[29] Pliny the Elder, Natural History 36.4.37 and 36.11.55 (trans. D. Eicholz).

quarrying enterprises, Dio Chrysostom tells us that a wealth of resources contributed little to the overall wealth of cities:

> If there were any utility in beautifully colored and variegated marbles, the same statement (that these cities would have been prosperous and have long maintained their existence as a state, safeguarding its own settlers and citizens) could be made about the cities of Teos and Carystos, as well as about certain Egyptian and Phrygian cities in whose vicinity the mountains are of colored stone – in fact, I hear that among their sarcophagi, the very ancient ones are of the same rock – yet, for all that, they are no better or more fortunate than any of the very lowly and pitiful cities.[30]

This study builds on the achievements of two recently defended dissertations at Oxford University that posit that the model of state monopolization in ancient quarries has been overstated. On the basis of epigraphic evidence concerning imperial quarries and mines, A. Hirt concluded that the state's general organizational principle was to keep involvement to a minimum without renouncing its control and contract most of the work out to private entrepreneurs in return for payment.[31] B. Russell's empire-wide analysis of the production and distribution of marble artifacts showed that no single system governed the marble trade; he argued that if any one principle was a determinant for trade, it was that of the demands made by the client for marble goods.[32] Contrary to current trends in scholarship, the principal client was not the emperor, but local civic elites eager to impress their constituents. Provinces, cities, or individual citizens could administer the allocation of the natural resources they owned, and while stone objects were produced and distributed as commodities, a quarry's location, accessibility, ownership,

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[30] Dio Chrysostom, Orations 79.2-3 (trans H. Crosby).
[31] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – AD 235 (Oxford 2010).
[32] B. Russell, Sculpted Stone and the Roman Economy 100 BC – AD 300 (Oxford 2009), Ph.D. dissertation.

infrastructure, and the appearance, quality, and reputation of the stone, the demand for certain products, and established relationships between cities and artisans lay behind the market for and trade in sculpted stone; as a result, most stone moving around the Roman Empire was transported to satisfy non-imperial demand. My dissertation approaches these questions from a local perspective to highlight the connections between the exploitation of marble resources, artisanal traditions, and exchange markets within Asia Minor. The remainder of this chapter lays out a historical and methodological framework fundamental to the case studies presented in the rest of the dissertation.

Marble quarries and the ancient economy in Asia Minor

The history of Anatolia in the Hellenistic and Roman periods was one of ongoing pacification, cultural negotiation, and settlement and growth. When Attalus III bequeathed his kingdom to Rome in 133 B.C., the *Provincia Asiae* was already bound together by a network of cities with complex socio-political institutions. While the Aegean coastal cities were Greek in outlook and urbanized, the interior was more rural and contained a mixed population of indigenous inhabitants of different ethnicities and Hellenic colonists. Augustus' establishment of the Principate put an end to the string of wars fought over the course of the first century B.C. and introduced a stability that endured through the third century A.D. The presence of permanent military garrisons and veteran colonies on border zones, the establishment of cities as centers of imperial administration, the implementation of an upgraded Roman tax system, and the creation of a road system ensured that the Roman presence in the region would be a lasting one.

The *Pax Romana* brought about a flourishing urban culture even in areas where cities did not previously exist and where populations had initially resisted Roman rule. Urbanization fostered conditions for population growth and increasing commerce. In Asia Minor, this was bolstered by an existing network developed in the Hellenistic period and by a competitive political-cultural environment where local elites jockeyed for prestige in the new political order. The incorporation of Asia Minor into an imperial system brought about a plurality of economic and social behaviors that marked a period of unprecedented wealth and connectivity. Public and private surplus wealth of local benefactors largely went to sponsoring building projects, festivals, and games, and the growth of urban centers, populations and civic stratification was coupled with an increase in the types of goods produced and circulated. The archaeological and written records tell us that cities throughout Asia Minor were famous for their livestock, wine, olive oil, textiles, metals, timber, stones, and slaves.

The region's geography, resources, existing degree of urbanization, and infrastructure were well-equipped to meet the demands of consumption.[33] The establishment of road networks across the Eastern Mediterranean, originally designed for military purposes, helped to facilitate trade, and determined patterns of distribution and wealth. The agents of trade ran the gamut of the social spectrum: the Roman state, shippers, merchants, private businessmen of Italian origin, and local, landed aristocrats. The Bithynian writer Dio Chrysostom paints a vivid picture of the bustling economy at the assize center of Apamea in Phrygia:

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[33] T. Broughton, Roman Asia Minor in T. Frank (ed.), An Economic Survey of Ancient Rome, Vol. IV (Baltimore 1938) 499-918; S. Mitchell, Anatolia: Land, Men and Gods in Asia Minor. Vol. 1 (Oxford 1993); S. Mitchell and C. Katsari (eds.), Patterns in the Economy of Roman Asia Minor (Swansea 2005).

> The courts are in session every other year in Apamea, and they bring together an unnumbered throng of people - litigants, juryman, orators, princes, attendants, slaves, pimps, muleteers, hucksters, harlots, and artisans. Consequently not only can those who have goods to sell obtain the highest prices, but also no one in the city is out of work…And this contributes not a little to prosperity; for wherever the greatest throng of people comes together, there necessarily we find money in greatest abundance, and it stands to reason that the place should thrive.[34]

Against the backdrop of regional and long-distance trade, the Roman state issued high customs taxes for state coffers. The *lex portorii Asiae*, also known as the *Monumentum Ephesenum*, an inscription set up in Ephesus in A.D. 62 bears witness to an intrusive act of economic imperialism.[35] A customs tax of 25 per cent was put on goods moving across the empire's eastern frontiers, and a 5 per cent *portoria* was applied to those moving between provinces. All communities, even those which were free, such as Aphrodisias, were liable to the *portoria*.

The Great Debate. Until recently, the "great debate" that took place over the course of the twentieth century dominated the agenda for studies on the ancient economy. In The Ancient Economy, M. Finley, who drew upon Marxist theories about the modes of production and K. Polyani's substantivist approach,[36] argued that the vast majority of people were engaged in an agrarian-based economy that barely operated above subsistence-level.[37] Finley emphasized the homogeneity of resources and exploitation of the Mediterranean environment, and argued that no region had an advantage over any other because none could produce a good that undercut the price of other locally-

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[34] Dio Chrysostom, Orations 35.15-16 (trans. J. Cohoon and H. Crosby).
[35] M. Cottier, M. Crawford, C. Crowther, J. Ferrary, B. Levick, O. Salomies, and M. Wörle (eds.), The Customs Law of Asia (Oxford 2008).
[36] K. Polanyi, C. Arensberg, and H. Pearson, Trade and the Market in the Early Empires (Glencoe 1957).
[37] M. Finley, The Ancient Economy (Berkeley 1973).

produced goods. The ubiquity of natural resources in the Mediterranean and the prohibitively high costs of overland transport coupled with lack of technological developments hampered regional specialization, and thus, interregional trade. Trade markets were limited to luxuries for the elites, who formed a tiny percentage of the population. Craftsmen and traders retained a humble position in society, producing and supplying goods mainly for local consumption. Even the citizens living in emporium cities derived their wealth from the land rather than from manufacture or commerce.

Conversely, M. Rostovtzeff had argued several decades earlier in The Social and Economic History of the Roman Empire that trade, cities, entrepreneurial activity, and an active middle-class were the basis for the Roman empire's prosperity. He populated his work his with copious references to the material record and envisioned the vast network of cities in the Roman Empire as evidence for a level of economic sophistication that approached the modern (capitalist) world, and emphasized his belief that the character of Roman commerce was driven almost entirely by private individuals. The land-owning bourgeoisie drove commercial activities, and owners of industrial establishments produced goods for profit and grew fabulously wealthy alongside the landowners and tradesmen engaged in their distribution. While acknowledging that slavery was endemic in Roman society, he singled out the province of Asia Minor to argue that that the main source of labor was the specialized workers or shop owners, who were able to levy considerable influence upon business operations.

With regard to provincial mines and quarries, Rostovtzeff believed that while the state was the largest owner, it did not monopolize ownership.[38] In the imperial period, as new provinces came under Roman control in different times and under different circumstances, the state diversified its system of exploitation to suit the unique conditions of each district. Variously, quarries and mines were leased out to private capitalists, who formed powerful associations or companies, to small scale-entrepreneurs, whose rent was collected by farmers or state officials, to contractors compensated based on the amount of material they extracted, or in specific cases, to civil and military officers, who oversaw convicts or slaves. Mines and quarries were a major source of wealth for the state, but they formed "merely small islands in the sea and meadows" of agricultural activities.[39]

With this background in mind, it is important to acknowledge that the debate has moved towards understanding whether the Roman economy experienced growth and how the economy affected different segments of the population. While scholars today agree that agriculture dominated the Roman economy, recent work has focused on whether agricultural wealth transformed other sectors of the economy.[40] Incomes generated from agricultural surpluses supported the development of other industries, and led to the creation of commerial markets as well as an infrastructure supporting commerce. The legal sources on agricultural estates, however, indicate that owners tried to manage their land as a way to minimize risk in order to ensure a stable income rather than reap large

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[38] M. Rostovtzeff, The Social and Economic History of the Roman Empire (Oxford 1926) 293-295.
[39] M. Rostovtzeff, The Social and Economic History of the Roman Empire (Oxford 1926) 295.
[40] D. Kehoe, "The Early Roman Empire: Production" in W. Scheidel, I. Morris, and R. Saller (eds.), The Cambridge Economic History of Greco-Roman World (Cambridge 2008) 543-569.

profits from their investments.[41] The amount of wealth concentrated in the hands of landowners, which would have determined the size of the manufacturing sector, is generally regarded as limited, in large part because the elite land-owning class were reluctant to invest in a manufacturing sector.

Research on the textile, ceramics, and brick industries has shown that owners of raw materials were separate from those in charge of organizing and marketing products. The evidence from brick stamps indicates that the (land)owners of clay deposits leased out exploitation rights to a third party, who exploited the clay, made the bricks, and sold them for construction projects.[42] The evidence from stamps and signatures on terra sigillata from Arretium in the late Republic and early Empire indicates that production was operated by independent artisans, who were either freedmen or slaves, in small workshops.[43] A master artisan earned money as both the workshop owner and as a backer of the businesses he helped his trainees to establish. Thus, the rewards from non-agricultural production went mainly to artisans of a humble social status. The entrepreneurial class never rose to such an extent as to rival the landed gentry, who remained far more interested in generating profits made from the exploitation of resources on their land than from the manufacture and distribution of these raw materials. For the purposes of this study, I will focus on more on the non-state actors involved in marble quarrying businesses, and ask whether quarrying generated wealth and for whom?

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[41] D. Kehoe, Investment, Profit, and Tenancy: The Jurists and the Roman Agrarian Economy (Ann Arbor 1997).
[42] T. Helen, Organization of Roman Brick Production in the First and Second Centuries A.D.: An Interpretation of Roman Brick Stamps (Helsinki 1975).
[43] G. Fülle, "The Internal Organization of the Arretine Terra Sigilata Industry. Problems of Evidence and Interpretation," Journal of Roman Studies (1997) 111-155.

METHODOLOGICAL APPROACHES

Quarry ownership and profit: The role of private individuals, municipalities, and sanctuaries as landowners

The presence of imperial and military officials at a select number of ancient quarries across the Roman Empire is well-attested, yet the bulk of quarries in this study were located on private or civic land. The evidence concerning quarry ownership on private and civic land is very patchy, and the sources come from both the western and eastern Mediterranean and cover a wide chronology, from the Hellenistic era to Late Antiquity. An inscription found on a block of Pentelic marble in Rome includes Herodes Atticus' name, suggesting that he may have counted the quarries among his properties. A review of the legal sources in Justinian's Digest indicates that not only did municipalities and private landowners retain control over quarries, the landowners had exclusive rights to mineral exploitation. Taken as a whole, the cases, which are mainly concerned with disputes over quarries on private land, indicate that land gained value if it had extractable natural resources and that private individuals could earn money from these activities. In general, the legal codes state that the rights of ownership over property extend from the sky above to the soil below. A third century Roman jurist tells us that if stone quarries were found on private property, no one was allowed to quarry the stone either in a private capacity or for the state without the express permission of the landowner. Yet the passage also shows that the foremost concern was the preservation of agricultural productivity, and other forms of income, such as quarries, were secondary and temporary:

> If it is established that there are stone quarries on your land, then without your permission, no one who does not have a right to do so can quarry

> stone, either in a private capacity or in the name of the state, that is, unless a custom exists in respect of those quarries to the effect that if anyone wishes to quarry stone from them, he may do so, providing he first of all gives the owner the usual indemnification in consideration thereof. Even then, he can only quarry stone if he has first of all given security to the owner that the latter will not be prevented from using such stone as he requires and that his enjoyment of his property will not be spoiled by the exercise of this right.[44]

As a general rule, landowners could earn money from whatever was produced on and taken from the land, and these were legally defined as "fruits of the land."[45] Ulpian and Javolenus, however, saw marble quarries as non-renewable resources, except - for unknown reasons - for certain marble quarries in Asia Minor and Gaul whose sources grew regeneratively, and that extracted marble was not considered to be "fruits of the land."[46] This legal distinction, however, did not prohibit the sale of marble found on private land or adversely affect property values. This is demonstrated in another proceeding when a usufructuary of a private estate was given the right to open a quarry and sell the quarried products. While the concern for the preservation of agricultural productivity was still present, the cultivated land could be taken over by mineral extraction if the value of the latter exceeded the former:

> May the usufructuary himself open stone quarries or chalk or sand pits? My opinion is that he is indeed entitled to do so, providing he does not appropriate for this purpose a part of the land required for something else. Accordingly, he can search for sites suitable for quarries and other similar mining operations; therefore, he can either work such mines of gold, silver, sulphur, copper, iron, or other minerals as were opened by the owner, or he can open such mines himself, providing this does not prejudice the cultivation of the land. If it should happen that the income from a mine he has opened should exceed that from the vineyards, plantations, or olives

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[44] Ulpian, Digest 8.4.13.1 (trans. A. Watson).
[45] Ulpian, Digest 39.2.26 and Ulpian from Sabinus, Digest 7.1.9.7
[46] Ulpian on Sabinus, Digest 24.3.7.13-14.

> groves which were already there, he may perhaps be allowed to cut these down, since he is free to improve the position of the bare owner.[47]

Private landowners also had the option of leasing land out to tenants for profit; state land in Egypt and Africa was regularly leased out in a similar manner. On the larger estates in Italy, where landholidngs were not adjacent plots of land, but were agglomerations of individual farms pieced together through inheritence or purchase, landowners dealt with management by leasing different farms out to tenants.[48] The case above provides yet another scenario; small-scale entrepreneurs in charge of quarrying on private land.

Cases dealing with divorces, dowried land, and quarries are largely concerned with whether it was the husband or the wife who had the right to the profits from the sale of stone.[49] The jurist Paul discussed a case in which a husband opened a quarry on land dowried to his wife:

> If the dowry includes a farm on which stone is cut, it is settled that the husband takes the profit from the quarry, since his wife obviously gave him the farm intending that its fruits go to the husband, except if the wife states a contrary aim in giving the dowry.[50]

Yet another case indicates that land gained value if the quarried stone was sellable, and private individuals could profit, perhaps handsomely, if the stone was of a high enough quality:

> A husband opened marble quarries on dotal land. Where there is a divorce, who owns the marble which has been extracted but not yet removed?

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[47] Ulpian on Sabinus, Justinian, Digest 7.1.13.5 (trans. A Watson).
[48] D. Vera, "Dalla 'villa perfecta' alla villa di Palladio: Sulle trasformazioni del sistema agrario in Italia fra principato e dominato," Athenaeum 83.1 (1995) 189-211; 83.2 (1995) 331-56.
[49] Ulpian on Sabinus, Digest 7.1.9.7 and Javolenus on Labeo Digest 18.1.77.
[50] Paul on Sabinus, Digest 24.3.8 (trans. A. Watson).

> Should the wife or the husband bear the expenses incurred in quarrying? According to Labeo, the marble belonged to the husband, but he said that nothing need be paid to the husband by the wife, because the expense was not necessary and I do not think the value of the land has been reduced, if the quarries were of the kind that the amount of stone in them could increase. If a delay is caused by a wife where there was a pact that she was to receive the land after paying the valuation of part of it to her husband, according to Labeo any profits in the meantime belong to the husband. I think the better view is that the husband should receive a proportionate share of the profits and the woman should get back the rest. This is the rule we apply.[51]

For the purpose of this study, it is clear that private citizens could oversee quarrying operations, land with extractable stone increased in value, and landowners stood to profit from the commerce in stone and metals. Although hidden in the archaeological record, the legal sources reveal that the connection between private ownership of quarries and the sale of their product is sufficiently attested and that marble quarrying had the potential to be a lucrative business for a private landowner. As Varro says, "even though stone quarries, sand pits, and clay pits are not relevant to agriculture, this does not mean that they should not be worked in land where they are suitable and provide profit."[52]

Although there is no direct evidence, sanctuaries may have also owned quarries and leased out quarry operations to small-scale entrepreneurs. In Hellenistic and Roman Asia Minor, temples functioned as economic institutions, and were major land-owners.[53] At Pisidian Antioch, Strabo mentions the large number of sacred places and temple-slaves associated with Men Askaenos; at Sardis, a boundary stone indicates that Caesar

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[51] Javolenus on Labeo, Digest 23.5.18 (trans. A. Watson).
[52] Varro, On Agriculture 1.2.22-23.
[53] B. Dignas, Economy of the Sacred in Hellenistic and Roman Asia Minor (Oxford 2002) 95-106.

extended the inviolable land of the temple of Artemis.[54] Pausanias says that the wealthiest and largest sanctuary in Ionia was the temple of Artemis. Boundary stones attest Artemis' vast properties and to the reconfiguration of large estates during the reigns of Augustus, Domitian, and Trajan.[55] Economic activities on sacred land generated revenues for the gods, and ensured a stable income for the maintenance of their cult. For the temple of Artemis at Ephesus, Strabo and Xenophon tell us that profits came from sacred ponds at the mouth of the Cayster river, from an island where sacred deer were kept, and from tithes on pasture lands.[56] Vitruvius discusses a quarry connected to the construction of the archaic temple, but he does not reveal whether it belonged to the sanctuary. The discovery of two boundary stones in close proximity to the Belevi and Hasançavuslar quarries provides similarly suggestive, but inconclusive evidence for counting quarries among the temple's land-holdings. It seems advantageous for the temple to open a quarry on its land in order to cut down on the costs arising from the construction or repair of the temple, such as in 6 B.C., when temple revenues were used to build a wall enclosure around the temple of Artemis and the new Sebasteion. Additionally, inscriptional evidence tells us that the temple donated funds from its revenues to building projects within Ephesus; in the Augustan period, temple revenues paid for a street paving, and during the reign of Domitian, for the construction of the Harbor gymnasium. Ready access to and contribution of building materials may lie behind the role of temple as a benefactor of public monuments.

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[54] Strabo, Geography 12.8.14
[55] Pausanias, Description of Greece 7.5.4; B. Dignas, Economy of the Sacred in Hellenistic and Roman Asia Minor (Oxford 2002) 169-177.
[56] Strabo, Geography 14.1.26, 14.1.29; Xenophon, Anabasis 5.3.9.

It was a regular practice for temples in Asia Minor to lease land to private individuals in order to generate revenue. A series of land-lease agreements found in Carian Mylasa and four of its neighboring communities, dated from the 150 – 75 B.C., deal with the purchase and lease of land by sanctuaries.[57] The documents detail the transactions in which private landowners were urged to sell their land to the sanctuary and then immediately to rent it back. While the sanctuary gave up the right to manage its sacred properties, the temple received a regular rent that allowed it to secure revenues on a permanent basis. This system continued into the Roman period, and to such a degree that the temple had to protect its sacred territory from the encroachment of private individuals. An Antonine dedication made to the "administrators in charge of lease of the sacred ponds" at Ephesus indicates Artemis' properties were rented out; other productive land was probably dealt with in the same way. Under these circumstances, it is easy to envision a scenario in which the temple leased out quarry operations to small-scale entrepreneurs.

There is even less evidence for municipal ownership of quarries. Epigraphic evidence for public slaves who worked in the quarries at Luna indicates that the municipality may have owned the quarries.[58] Suetonius' claim that "many states and individuals were deprived … of the right of working mines and collecting revenues,"

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[57] B. Dignas, "The Leases of Sacred Property at Mylasa: An Alimentary Scheme for the Gods," Kernos 13 (2000) 117-126.

[58] An inscription on a block of Luna marble names a foreman along with a list of slaves, organized in a *collegium*; the mark COL appears alongside the names of the slaves. COL has been interpreted as the *coloniae* of Luna; further evidence for the existence of public slaves in Luna is given in an epitaph for a *servus colonorum Lunensium*. M. Hirt, Imperial Mines and Quarries in the Roman World: Organization Aspects 27 B.C. – A.D. 235 (Oxford 2010) 314-318.

implies that municipalities may have profited from mining ventures before confiscation.[59] A number of cases in Justian's Digest provide evidence for municipalities leasing land out to private individuals.[60]

Regional survey and landscape archaeology

Regional survey and landscape archaeology are useful research and theoretical tools for fleshing out land use as described by the historical sources. Because the largest quarries of antiquity are considered archaeological sites unto themselves, they are often described in a vacuum as if they existed separately from their larger environs. A regional archaeological approach is useful in the study of quarries because it opens the scale of inquiry from the site to the region. Regional surveys, fundamentally concerned with the relationships between humans and their natural environment, have achieved great success in illuminating patterns of regional settlement and the nature of resource exploitation in a given area over broad time-scales. The vast amount of data collected from archaeological surveys has engendered the view that archaeological sites are not "dots on a map," but parts of an entire landscape.[61] The survey of quarries undertaken as part of the Aphrodisias Regional Survey was designed to identify and document all quarries within the natural geographic boundaries of a civic territory through extensive survey methods. The discovery of a number of smaller, anonymous quarries provides more of a complete picture of stone exploitation since the notions of space inherent in regional analysis help

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[59] Suetonius, Lives of the Caesars, Tiberius 49.2.
[60] Justinian, Digest 6.3.1; 10.10; 19.13.6.
[61] R. Witcher, "Broken Pots and Meaningless Dots? Surveying the Rural Landscape of Roman Italy," Papers of the British School at Rome 74 (2006) 39-72.

to explain how the natural landscape was transformed into an industrial one. Archaeologists' use of the term landscape can be enormously broad, encompassing the gamut of human experience within their environment. Landscape archaeology, drawing on postmodern currents in anthropology and social theory, constructs landscape as a creation of human cognition.[62] I refer to the term "landscape" as it is related to geology (a single conglomeration of landforms, modified by geological forces), ecology (the inter-relations between geological, biological, and human processes), economy (the available set, and exploitation of, natural resources available in a region), and social actions (as arenas for the construction of identity, memory, and social inequality).

Exchange, consumption, and Greco-Roman marble culture

This dissertation documents a healthy local market exchange within individual cities, but also examines the distribution and consumption of marble at larger scales. While ancient cities drew the bulk of their building materials from nearby environs, it remains unclear to what extent, or if, they exported their own stone for profit and imported prestigious marbles from distant locales. Anthropological studies on quarries have shown that geographic, geologic, and ecological conditions, access to imported raw materials and goods, and the degree of political centralization affected exchange and distribution.[63] In the Greco-Roman world, discussion of the distribution and consumption of goods has usually revolved around distinctions between categories of

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[62] C. Tilley, A Phenomonology of Landscape: Places, Paths, and Monuments (Oxford 1994) focuses on how a landscape can be experienced in the abstract, while A. Knapp and W. Ashmore, Archaeologies of Landscape (Oxford 1999) categorize landscape into three concepts: constructed landscapes display culturally meaningful built features, conceptualized landscapes imbue the natural environment with cultural meanings, and ideological landscapes evoke spiritual responses.

[63] C. Cobb, From Quarry to Cornfield (Tuscaloosa 2000) 33.

luxury and staple goods, between local, regional (sometimes called inter-regional), or long-distance distribution, and finally between practice (reciprocity, gift exchange, or market exchange).[64] A number of intangible and complicated sociological and ideological concepts were attached to objects crafted from raw materials, and it was these social values that drove consumption. This section presents a framework for understanding how these various factors coalesced in the Roman period to create the enormous demand for marble seen in the archaeological record.

Exchange in heavy commodities like marble was contingent upon a favorable geographic location. A geographically deterministic viewpoint argues that a city's physical setting, which includes access to waterways and trade routes, directly affected a city's participation in marble consumption. Many exporting marble quarries were in fact located on either islands or near the sea; it follows that quarries and cities located along coasts or in plains will display different patterns of production or consumption from those located in the interior or in mountains.

Geology forms an active background to human activities; it can impose real limits or offer great advantages to settlements.[65] In many instances, settlers had to chose between the availability of stone, water, and/or arable soil, or endure earthquakes, landslides, or the silting of waterways.[66] In Western Asia Minor, entire cities are constructed out of marble and limestone; their abundant local availability, physical (strength, permanence, workability) and visual properties made them the natural choice

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[64] N. Morley, Trade in Classical Antiquity (Cambridge 2007) 9-11.
[65] D. Crouch's study highlighted how topography, the water supply and drainage, and the availability of building materials influenced the trajectory of urban development in select cities in Greece and Asia Minor; D. Crouch, Geology and Settlement: Greco-Roman Patterns (Oxford 2004).
[66] T. Van Andel, C. Runnels, and K. Pope, "5,000 Years of Land Use and Abuse in the South Argolid, Greece," Hesperia 56 (1986) 103-128.

for building, and the richness of the geologic deposits allowed the local inhabitants to cultivate regional specialization of an exceptional stone-carving craft tradition. Local stones blend attractively into the surrounding landscape, and a major factor in selection was an economic one; because local building materials did not incur large transport costs, they were used whenever possible.[67]

Marble, subject to unique geologic conditions and formation processes, was sparsely distributed across the Mediterranean.[68] The great majority of deposits were located in the in the Aegean region and Egypt. The Levant, Cyprus and Libya were marble-poor, and relied on local limestone sources for building. In the Western Mediterranean, the bulk of the territory was poorly supplied with marble in comparison to the limestones, sandstones, and occasional tuff, granites, porphryies, and basalts that were more readily available, and the building material of choice.

There were marble outcrops in the Western Mediterranean, including the yellow (Chemtou) and the blue and white (Cap de Gard) marble quarries of North Africa, the white (Macael, Almadén de la Plata), black and gray (Alconera) and red (Antequera) quarries along the southern shores of Spain, the fine white and gray (St. Beat), the red, pink and white, or green and white (Campan), the white and black (Aubert) marble quarries in the Pyrenees in France, and the white (Philippeville) marble quarry in Belgium. While Italy was a province rich in stone resources, its marble deposits were comparatively limited. Marble quarrying activities were centered in the Northwest in the

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[67] F. Bell, "Engineering Geology and Building Stone of Historical Monuments: Construction Materials; Geological Origin; Quarries," in P. Marinos and G. Koukis (eds.), Engineering Geology of Ancient Worlds, Monuments and Historical Sites Volume 4 (Rotterdam 1990) 1867-1874.

[68] The geologic history of the Aegean is described in M. Higgins and R. Higgins, A Geological Companion to Greece and the Aegean (Ithaca 1996).

Apuan Alps where a variety of colored sources of marble were exploited alongside the famed source of white marble (Carrara) for Rome. A handful of white marble quarries linked to the development of Roman cities have also been identified in Switzerland, Austria, Germany, Croatia, and Romania.

In Asia Minor, the preference for building in stone in a region where mudbrick and timber were the easiest building materials to procure was also a cultural decision. The shift from building monumental religious buildings in wood to stone during the archaic period cemented a communal identity that was fundamentally Greek, and carried powerful messages of social status and identity. Raw materials, difficult to obtain, required a great investment of labor, skill, and time, and were usually under the control of elites. Anthropological work has shown that elites limited access to the materials and technology used in production to maintain their exclusivity and worth.[69] Monetary values attached to materials were complex and could variously be based on capital, labor, utility, abundance or scarcity, exchange rate, and social value.[70] The ideologies associated with stone-carving in the archaic period lasted for centuries and became a hallmark of Greek identity under Roman rule and of Roman culture in general.

Roman archaeologists have spoken of a "consumer culture"[71] or a "consumer revolution."[72] K. Greene argued that the values of upper-class society in Rome – emulation, instruction, literacy, and mobility – fueled consumerism, and that territorial

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[69] E. DeMarrais, L. Castillo, and T. Earle, "Ideology, Materialization, and Power Strategies," Current Anthropology 37.1 (1996) 18.
[70] A. Appadurai (ed.), The Social Life of Things: Commodities in Cultural Perspectives (Cambridge 1986) 31.
[71] R. Hingley, Globalizing Roman Culture: Unity, Diversity, and Empire (London 2005) 120.
[72] G. Woolf, Becoming Roman: The Origins of Provincial Civilization in Gaul (Cambridge 1998) 174 and 181-183.

expansion and economic development in the Republican period brought relative security along with access to new material possessions in unprecedented numbers.[73] Material consumption had distinct social dimensions in both public and private spheres that came to be associated with the Roman conception of conspicuous luxury, articulated both by writers from the eastern half of the empire as well as those living in the west. As already discussed, the predilection for building cities reflected a decision to invest a significant portion of surplus wealth in public architecture, and was a means of establishing political, ideological and economic power. Literature on the architecture and décor of the Roman house, primarily focused on the region around Rome and the Bay of Naples, has shown the myriad of ways in which the owner could articulate his social status and identity through the display of mosaics, wall paintings, or sculpture.[74] The material record indicates that aristocratic leaders of the wealthy in Rome set the standard for taste; these fashions were emulated by elites across the empire and trickled down the ladder of social hierarchy.[75]

The marble culture of the Greek world came to be equated with wealth and urbanity, and given the prestige of stone architecture in the Greek tradition, Asia Minor had an obvious advantage over other places because of its abundance of geological deposits. Roman sources emphasize the introduction of marble into architecture in Rome, suggesting that marble was an important part of the appeal that architecture in the Greek East held for the Romans. Pliny the Elder describes at great length the moral outrage

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[73] K. Greene, "Learning to Consume: The Origins of Provincial Civilization in Gaul," Journal of Roman Archaeology 21 (2008) 64-82.
[74] E. Gazda (ed.), Roman Art in the Private Sphere (Ann Arbor 1991).
[75] P. Bang, The Roman Bazaar: A Comparative Study of Trade and Markets in a Tributary Empire (Cambridge 2008) 114.

caused by the importation of expensive monolithic columns from Teos and Mt. Hymettos that were used to decorate the private homes of the M. Scaurus and L. Crassus.[76] During the military expansion of the Republican period, Roman generals began the tradition of embellishing Rome with monuments made from newly acquired materials overseas. In the third and second centuries B.C. in Republican Rome, Italian architects and sculptors had little knowledge of marble, and called upon both Greek architects and skilled marble-workers.[77] The Round Temple in the Forum Boarium and the Temple of Jupiter Stator, built by the Hellenistic architect Hermodorus from Salamis in 146 B.C., were among the first monuments built out of marble in the city of Rome. Several decades earlier, L. Scipio brought artists from Asia Minor to Rome after the Battle of Magnesia in 189 B.C., and F. Fulvius Nobilior did the same with artists from Greece after capturing Ambracia in the same year; Mark Antony took a prisoner of war from Alexandria as a sculptor, named C. Avianus Evander. The most visible manifestation of the struggle for power between Caesar and Pompey was their sponsorship of huge public buildings in downtown Rome, and it was for these construction projects that Caesar opened Italy's first marble quarries at Luna. Following in the footsteps of the Roman generals, Augustus culled expensive marbles from his newly conquered provinces to symbolize the ideology of imperialism.[78] Roman emperors continued building public architecture with imported marbles until the

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[76] Pliny the Elder, Natural History 36.6.
[77] J. Toynbee, "Some Notes on Artists in the Roman World II: Sculptors," Collection Latomus 9 (1950) 49-65.
[78] C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy: Production and Distribution in the Roman Empire in the Light of Instrumentum Domesticum. Journal of Roman Archaeology Supplementary Series 6 (Ann Arbor 1993) 145-170.

reign of Septimius Severus; this was a tradition that would emerge with new forms and meaning in Late Antiquity and last well into the Byzantine period.

A number of Roman and Byzantine writers – including Athenaeus, Cicero, Lucian, Pausanius, Pliny the Elder, Procopius, Quintilian, and Vitruvius - spent a great deal of time praising marble, believing that its special physical characteristics set it apart from ordinary stone. Some, like Seneca, even viewed the Roman obsession with marble as a sign of society's moral decadence and decline:

> We think ourselves poor and mean if our marbles are not from Alexandria, are not set off by mosaics of Numidian stones,… if our swimming pools are not lined with Thasian marble, once a rare and wonderful sight in any temple…. I have so far been speaking of the ordinary bathing-establishments; what shall I say when I come to those of the freedman? What a vast number of statues, of columns that support nothing, but are built for decoration, merely in order to spend money!…We have become so luxurious that we will have nothing but precious stones to walk upon.[79]

Pliny the Elder's Book 36 illuminates the reasons why the Romans held marble in such high esteem, beyond its associations with Greekness and overseas conquest. Quarrying marble from mountains displayed control over nature and prowess in architecture and technology; marble construction was associated with two of the Seven Wonders of the World, including the Temple of Artemis at Ephesus and the Mausoleum of Halicarnassos. Pliny claims that marble carving was older than painting or casting bronze statues,[80] and as it was first used in temple construction and royal burials, it was linked to the gods and omnipotent rulers. Associations with the supernatural were common; there was a tradition in the Paros quarries that when the stone-breakers split

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[79] Seneca, Epistles 86.6-7 (trans. R. Gummere).
[80] Pliny the Elder, Natural History 36.4.15.

open a block, a likeness of Silenus would appear and in certain quarries, the stone magically regenerated itself. While there are very few sources that discuss marble working from the point of view of the artisan, Pliny tells us that Greek sculptors preferred white marbles to all other stones.[81] White marbles were especially well-suited to fine carving since they offered the advantage of being relatively soft and easy to work when first quarried and their translucency gives a visual depth beyond the surface that evokes the realistic qualities of human flesh; so much so that it was a common story in antiquity for mortal men to mistake a statue of Venus for a living woman. White marble also served as a canvas for the application of paint for statuary. Finally, the display of imported marbles was a signifier of high living. As a substitute to imports, expensive colored marbles were imitated in wall painting, but could be painted with colors that were more vivid than the natural stone. Colored marbles created an aura of luxury, wealth and prestige, and were selected as much for their physical and visual properties as for their symbolic value. The prices of 19 different types of colored marbles listed in Diocletian's Price Edict from A.D. 301 indicate that commercial prices were high, and that there were profits to be made from their sale.

THE SOCIAL CONTEXT OF MARBLE PRODUCTION

There is an assumption among historians of classical art that the lack of marble in a geographic region prevented local artisans from acquiring the skills to carve marble,

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[81] Pliny the Elder, Natural History 36.4.

requiring skilled craftsmen to be brought in from the outside.[82] Attendant upon this is the idea that Roman art is deeply indebted to Greek artistic traditions.[83] In the context of this study, such notions have led to the assumption that marble workers traveled with their local materials (usually from the Greek East) and that the appearance of foreign materials and decorative schemes (usually in Rome) demonstrated the presence of itinerant craftsmen. This study contributes to these debates by simultaneously examining the nature of marble exploitation and the behaviors of artisans in a region famed for marble production.

Because of the centrality of the status of craftsmen both in scholarship on Roman art and the economy, it is important to outline the division of labor within the marble quarrying industries and ask how much social mobility was granted to marble workers. The opinion expressed by Lucian of Samosata, who was deciding whether or not to join the family stone-cutting business, reflects the generally disdainful attitude of the literary sources towards those who worked with their hands:

> If you become a stone cutter you will be nothing more than a workman, doing hard physical labor….You will be obscure, earning a small wage, a man of low esteem, classed as worthless by public opinion, neither courted by friends, feared by enemies, but just a common workman, a craftsmen, a face in the crowd.[84]

The main working sites for marble production were in stone quarries, in marble carving workshops located within cities, presumably on the side of town closest to the quarries, and at the construction site itself. In the quarries, literary and epigraphic

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[82] These ideas have recently been examined in G. Adornato (ed.), Scolpire il Marmo: Importazioni, Artisti Itineranti, Scuole Artistiche nel Mediterraeneo Antico (Milan 2010).
[83] For an exposition of these notions, see D. Conlin, The Artists of the Ara Pacis (Chapel Hill 1997); E. Gazda (ed.), The Ancient Art of Emulation (Ann Arbor 2002).
[84] Lucian, Dream 6-9.13 (trans. A. Burford).

sources show that the workers were drawn from a variety of social segments. While Christian martyrs, criminals, military prisoners, and slaves were condemned to do hard labor in the quarries, quarrymen could also be free, skilled, and well-paid workers, who came from nearby towns.[85] A set of papyri from Mons Claudianus is instructive for understanding the division of labor within quarrying operations, and attests a high degree of specialization. The texts, which list water rations according to function, describe a working team of 26-86 men overseen by a foreman. Most of the men in the team were stonemasons, whose jobs included freeing blocks of marble from the native bedrock, setting wedge holes, dressing and shaping blocks, and preparing transportation. The smiths, bellowsmen, adze specialists, hardeners, hammerman, and crane-specialists listed alongside guards and water carriers appear to have had specialized knowledge of the machines and tools used during quarrying. Archaeological evidence from a number of larger quarries indicates that quarrymen often lived on-site in purpose-built worker villages, some even with their families.[86]

Given that quarrying was hard labor and that many workers were slaves or freedmen, their career opportunities may have been limited to a single location. Yet there does seem to have been fluidity in the jobs associated with marble working. The aforementioned inscribed blocks at Carrara refer to a *collegium* of slave stonemasons in the early Tiberian period, indicating that they were allowed to organize themselves into

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[85] St. Cyprian, Letters 77.2.4; F. Millar, "Condemnation to Hard Labour in the Roman Empire from the Julio-Claudians to Constantine," Papers of the British School at Rome 52 (Rome 1984) 124-147; H. Cuvigny, Mons Claudianus. Ostraca Graeca et Latina III. Les Reçus pour Avances à la Familia, O.Claud. 417 à 631 (Cairo 2000) 140-141; D. Peacock and V. Maxfield, The Roman Imperial Porphyry Quarries, Gebel Dokhan, Egypt. Interim Reports, 1994-1998 (Southampton 2001) 34.

[86] D. Peacock and V. Maxfield, The Roman Imperial Porphyry Quarries, Gebel Dokhan, Egypt. Interim Reports, 1994-1998 (Southampton 2001) 58-132.

formal associations.[87] The ancient term *marmorarii* was applied to both stonemasons and sculptors alike, indicating that professional lines were not firmly fixed.[88] Architects, who regularly visited the quarries, would have also been intimately familiar with various building materials, and were likely trained in stonemasonry. The architect Cossutius, the supposed builder of the Olympeion in Athens, belonged to a wealthy family with connections to the extraction and supply of marble. Inscriptions of the Cossutia family, which span the first century B.C. to the second century A.D., mention workers with both Greek and Italian names, who were employed as both marble-cutters and sculptors.

Architects were experts in design, engineering, management, and planning, and had more opportunities for social mobility than the stonemasons in the quarries. Even so, the question of the social status of architects in antiquity remains an open-ended one.[89] At the low end of the social spectrum were the 500 slaves who were both architects and builders for their owner Crassus, while in the upper echelons was an architect like Apollodorus of Damascus, closely linked with Trajan and Hadrian. Architects probably had the greatest opportunities for social mobility out of all the careers associated with marble working; Augustus, Tiberius, Trajan and Hadrian all dealt with their architects personally, and Hadrian famously even considered himself one.

Carving often took place in workshops. The term workshop refers both to the discovery of the physical traces of marble working as well as the production of art by the

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[87] CIL XI, 1319, 1320, 1322, 1356.
[88] Enciclopedia dell'Arte Antica, Classica e Orientale (Rome 1961) 870-875.
[89] For an extended discussion on social status, see J. Anderson, Roman Architecture and Society (Baltimore 1997) 14-67; M. Wilson-Jones, Principles of Roman Architecture (New Haven 2000) 26-30.

same group of craftsmen.[90] Marble sculptors acquired and developed their skills through the master-apprentice relationship, and these skills were often passed down from generation to generation. Plato says that sons learned their craft from their fathers.[91] Lucian was trained as a sculptor in his uncle's workshop.[92] The limited number of archaeologically-attested workshops indicates that their physical size was small. For the most part, ancient sources and archaeological evidence do not reveal a strict hierarchy in the division of labor, although the most experienced carvers certainly would have been considered masters and would have been in charge of a number of assistants. Sculptors gained experience over time, and this cumulative knowledge likely gave them a specialization in squaring blocks, carving architectural ornament (columns, capitals, entablatures, or bases), or sculpture (relief or freestanding). Marble production also required a specific set of skills beyond carving. Draftsmen were needed to draw; pointers to measure and plumb-bob; modelers to cast statues in clay or plaster molds; cutters to produce letters; finishers to polish the marble with abrasives; and transporters to take finished pieces to the building site.

The ancient sources are for the most part silent about sculptor's personal histories, and the marble artists of the Roman period remain anonymous figures. In rare cases, artists would sign their names along with their hometowns to the work of art they produced. In particular, signatures of Aphrodisian, Athenian, Dokimeion, Nicomedian and Proconnesian marble-workers have also been found on a variety of marble products

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[90] W. Heilmeyer, "Ancient Workshops and Ancient 'Art'," Oxford Journal of Archaeology 23.4 (2004) 403-415.
[91] Plato, Protagoras 328A.
[92] Lucian, Dream 11.21-28.

throughout the Roman empire. An artists' statement of workshop affiliation and geographic origins have been interpreted as a kind of quality mark when found in the western part of the Roman empire; in all likelihood, signatures probably represented the name of the master craftsmen at a particular workshop, and reflected relatively small-scale workshop organization.[93] Epigraphic evidence indicates that many sculptors who signed had Greek names, and were slaves or freeborn members of Greek communities who did not possess Roman citizenship; but an artisan could gain social standing through good craftsmanship, such as the second century fresco-painter from Cyrene, who became a town-councilor, or the fourth century A.D. Aphrodisian sculptor Flavius Zeno, a private citizen honored as a priest of the imperial cult, who both made and gave a statue in his own name.[94]

Wealthy patrons funded the architectural and sculptural commissions that artisans worked on, and it was this patronage drove the demand for marble goods. Vitruvius tells us that the fame and fortune of a craftsman was entirely dependent upon their patron; only those craftsmen attached to "great states, kings, or famous citizens attained renown. But those who had not less eagerness, and were distinguished by talent and skill, but being of humble fortune executed for their fellow-citizens works not less perfect, gained no reputation."[95] The patron could be involved in and exert control over every step of the building process. Cicero's writings show that he paid close attention to the details of

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[93] K. Erim and C. Roueché, "Sculptors from Aphrodisias: Some New Inscriptions," Papers of the British School at Rome 50 (1982) 102-115.
[94] P. Stewart, The Social History of Roman Art (Cambridge 2008) 19-20.
[95] Vitruvius, On Architecture 3.1-3.

construction, inspecting the work, altering features, choosing the materials and decoration.[96]

The centrality of the patron-client relationship in Roman society ensured that artisans had to find work where it was available in order to make a living and ultimately, to survive. In a place where the demand for carved marbles was steady, usually in larger metropolitan areas such as Rome, Alexandria, and Athens, artisans could lead a settled lifestyle, and operate out of permanent studios. While most craftsmen were connected to the local workshops that served local needs, they also had to be prepared to travel. Given the nature of stonemasonry, craftsmen had to work both on-site and in the workshop. Where the resources of trained-masons were scarce, skilled-labor would have been imported. The epigraphic record attests to sculptors from Gaul traveling to work on projects in North Africa, Germany, and Britain in addition to the signatures of the traveling sculptors from the Greek East.[97]

In German scholarship, these issues have been addressed through a consideration of the *Bauhütten* (workshops).[98] Traveling workshops that were both large and long-lasting have been used to explain the similarity of forms in Roman architectural decoration in various parts of the Roman empire. For example, the certain architectural forms used in the cities of Asia Minor can also be seen in the temple of Hadrian, temple of Venus and Roma, and in the mausoleum of Hadrian; scholars have argued that the similarity of the capitals and moldings, executed in imported Proconnesian marble, betray

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[96] Cicero, Letters to Quintus 3.1.1; Letters to Atticus 1.4.3; 1.10.3;12.19.1; Letters to Friends 7.23.1.
[97] J. Toynbee, "Some Notes on Artists in the Roman World II: Sculptors," Collection Latomus 9 (1950) 58.
[98] K. Freyberger, Stadtrömischer Kapitelle aus der Zeit von Domitian bis Alexander Severus (Mainz 1990).

the work of a Ephesian/Pergamene workshop.[99] More recently, Plattner has examined the structure of workshops and aspects of marble production in Asia Minor in greater detail.[100] An analysis of the single elements of architectural decoration, such as an echinus, in fact shows a great deal of variation not only between cities, but between individual buildings; workshops were smaller and more short-lived than previously assumed. In Rome and Lepcis Magna, the capitals of an Asia Minor type executed in Asia Minor marbles were shipped fully finished from Asia Minor; entire workshops did not travel to the construction site.

Those artisans who were itinerant probably represented a small minority of craftsmen. The most-specialized and talented of artisans were likely to have been the most-traveled; these men would have been imported to work on commissions that required a particular skill-set that the local labor did not have. P. Horden and N. Purcell's generalization in The Corrupting Sea is useful for understanding itinerant lives of certain marble workers:

> The wandering artisan is a product of a *koine* which draws its energy in part from the irregular distribution of material sources….The artisan or professional whose craft marked out a special status that was often stateless, and the *metoikos*, the 'person who has changed abode,' as the principal entrepreneurs of antiquity.[101]

Artisans circulated both as specialists attached to clients and as private entrepreneurs. The mobility of materials and craftsmen were intimately tied together in

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[99] J. Ward-Perkins, Roman Imperial Architecture (New Haven 1994) 123.
[100] G. Plattner, "Transfer von Architekturkonzepten und Ornamentformen zwischen Kleinasien und Rome in der Kaiserzeit," Römische Historische Mittelungen 46 (Wien 2004); G. Plattner, "Werkstatt und Muster: Überlegungen zu Steinmetzbetrieben in Rom und Kleinasien," in G. Grabherr and B. Kainrath (eds.), Ikarus 3. Akten des 11 Österreichischen Archäologentages in Innsbruck 23.-25. März 2006 (Wien 2008).
[101] P. Horden and N. Purcell, The Corrupting Sea (Oxford 2000) 386.

the connected and interdependent worlds of the Mediterranean. The rarity and quality of a geological resource, and the established relationships between people and regions determined distribution patterns; and at the same time, Mediterranean connectivity fueled a mobile workforce seeking economic opportunity.[102] Throughout this study, I will examine the healthy local exchange markets both in marble and in highly skilled marble workers with a view similar to Horden and Purcell:

> The glamorous manifestations of high-prestige trade should generally be regarded as outgrowths from or intensifications of the routine patterns of redistribution….The volume of cabotage probably exceeded that of the great commercial ventures, and the relatively 'small' traders involved in it were quite capable of dealing in a tremendous variety and quantity of goods….The movement of goods associated with connectivity across 'short distances' take up a far larger portion of the overall picture than the usual narrative would suggest.[103]

By approaching questions of mobility from a local perspective, it is possible to highlight the local, regional, and supra-regional exchange markets in Asia Minor, and to understand the uniquely Greco-Roman phenomenon of moving heavy stone across the hinterlands of the Mediterranean.

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[102] P. Horden and N. Purcell, The Corrupting Sea (Oxford 2000) 123-172.
[103] P. Horden and N. Purcell, The Corrupting Sea (Oxford 2000) 150.

CHAPTER 3

THE REGIONAL MARBLE QUARRIES OF APHRODISIAS

The marble resources of the territory of Aphrodisias were vital to the urban development and local sculptural tradition of the city. Aphrodisias is very substantially built out of marble, and good-quality sources (the City Quarries) lie two km north of the city center (Figs. 3.1, 3.2). The proximity of these quarries to Aphrodisias, the epigraphic and archaeological evidence for the local sculptural tradition, and the extraordinary preservation of the city's marble architecture have led scholars to assign these quarries and the marble industry in general a prominent role in Aphrodisias's history.[104] The prosperity of the city has been attributed to the exploitation and exportation of marble,[105] and profits from private ownership of the quarries have been directly linked to the euergetism that fueled the ambitious urban development of this medium-sized but remote town in the first and second centuries A.D.[106]

The discovery of eight new marble quarries in the territory of Aphrodisias by the Regional Survey Project sheds valuable light on the character of the local marble industry and on many outstanding questions. Did Aphrodisias use its territorial marble resources

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[104] K. Erim, Aphrodisias (New York 1986) 30–31, 134–36.
[105] D. Monna and P. Pensabene, Marmi dell'Asia Minore (Rome 1977) 94.
[106] J. Reynolds, Aphrodisias and Rome (London 1982) 156–64; K. Erim, Aphrodisias (New York 1986) 32.

largely for civic adornment, or also for trade? What role, in other words, did marble play in the local economy? Was profit restricted to the local craftsmen and entrepreneurs engaged in construction and the production of sculpture, or did the city as a whole benefit from the export of its marble? And is Aphrodisias unusual or typical in the way it used and benefited from its local stone?

Aphrodisias lies at the center of a number of contemporary scholarly debates on marble exploitation in the Roman period. The notion that Aphrodisias was the locus of an important "school" of virtuoso sculptors took root in the mid-twentieth century in the wake of earlier French and Italian excavations at the site.[107] Even before these excavations, it was recognized that Aphrodisias was already well known for its expert sculptors.[108] Nearly 40 inscribed signatures have been found on sculptures in Italy, Greece, Crete, and Asia Minor, as well as at Aphrodisias itself.[109] The most famous of these signed pieces are from in and around Rome: a mythological group from the Esquiline Hill, the two Centaurs from Hadrian's Villa at Tivoli, and a figured relief of Antinous as Silvanus from Torre del Padiglione.[110]

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[107] M. Collignon, "Notes sur les Fouilles Executées à Aphrodisias par M. Paul Gaudin," Comptes Rendus des Séances de l'Académie des Inscriptions et Belles- Lettres (1904) 703–11; G. Jacopi, "Gli Scavi della Missione Archeologica Italiana in Afrodisiade," Monumenti Antichi 38 (1939–40); F. Squarciapino, La Scuola di Afrodisias (Rome 1943).

[108] F. Squarciapino, La Scuola di Afrodisias (Rome 1943) 12–17.

[109] For the Aphrodisian sculptor's signatures: K. Erim and C. Roueché, "Sculptors from Aphrodisias: Some New Inscriptions," Papers of the British School at Rome 50 (1982) 102–15; and P. Pensabene, "Le Principali Cave di Marmo Bianco," in M. De Nuccio and L. Ungaro (eds.), I Marmi Colorati della Roma Imperiale (Venice 2002) 217.

[110] For the Esquiline Group, see M. Moltesen, "The Aphrodisian Sculptures in the Ny Carlsberg Glyptothek," in C. Roueché and K. Erim (eds.), Aphrodisias Papers. Journal of Roman Archaeology Supplementary Series 1 (Ann Arbor 1990) 133–46; M. Moltesen, "The Esquiline Group: Aphrodisian Sculptures in the Ny Carlsberg Glyptotek," Antike Plastik 27 (2000) 111–29. For the Centaurs, see J. Raeder, Die Statuarische Ausstattung der Villa Hadriana bei Tivoli (Frankfurt 1983). For the Antinous relief, see C. Clairmont, Die Bildnisse des Antinous (Bern 1966).

By the time the current program of excavations began at Aphrodisias in the early 1960s, the belief that local workshops shipped both their statues and their sculptors across the empire was well established and began to influence the interpretation of archaeological evidence elsewhere.[111] Scholars posited that sculptures in the style of those excavated at Aphrodisias were by Aphrodisian sculptors, and were perhaps also carved in Aphrodisian stone. On the basis of stylistic affinity, some suggest that Aphrodisian sculptors may have played a major role in the architectural decoration of Severan Lepcis Magna,[112] and that groups of statues at a Late Antique villa at Chiragan in Gaul are the products of an Aphrodisian workshop.[113]

Recent work has called many of these assumptions into question. Isotopic tests have shown that the origin of the marble in the Severan Forum and Basilica at Lepcis Magna is Proconnesian and not Aphrodisian.[114] While traditions of fine marble carving grew up around international production centers, and sculptors in the Roman period are known to have circulated widely in both regional and international networks, the international marble export market as described in chapters two and four is now

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[111] F. Squarciapino, La Scuola di Afrodisias (Rome 1943); K. Erim, Aphrodisias (New York 1986) 32; J. Ward-Perkins, Marble in Antiquity (London 1992) 153; P. Pensabene, Marmi Antichi II (Rome 1998) 45; N. De Chaisemartin, "Technical Aspects of the Sculptural Decoration at Aphrodisias in Caria," in M. Schvoerer (ed.), ASMOSIA IV (Bordeaux 1999) 261–67.

[112] F. Squarciapino, Leptis Magna (London 1966) 93, 108, 118; J. Ward-Perkins, "Nicomedia and the Marble Trade," Papers of the British School at Rome 48 (1980) 64–68. While Ward-Perkins advances the idea that Aphrodisian craftsmen could have had a hand in the design of the city, he does so skeptically and calls for a reexamination of such a theory.

[113] N. Hannestad, Tradition in Late-Antique Sculpture: Conservation, Modernization, Production (Aarhus 1994) 127–43; M. Bergmann, Chiragan, Aphrodisias, Konstantinopel: Zur mythologischen Skulptur der Spätantike (Rome 1999) 26–43, 55.

[114] Sampling from architectural pieces in the Basilica vestibule and Forum colonnades, believed to have been crafted by Aphrodisian workmen, was carried out recently by an Italian team; see F. Bianchi, M. Bruno, C. Gorgoni, P. Pallante, and G. Ponti, "The Pilasters of the Severan Basilica at Leptis Magna and the School of Aphrodisias: New Archaeometric and Archaeological Data," in P. Jockey (ed.), ASMOSIA VIII (Aix-en-Provenace 2011). S. Walker, "Marble Origins by Isotopic Analysis," World Archaeology 16 (1984) 217, proposes that the marble was from Dokimeion on the basis of isotopic analysis, but does not specify sample locations.

understood largely as the purview of the emperor and the state-owned quarries.[115] Combined with advances in marble provenancing studies, the examination of local marble resources undertaken as part of the Aphrodisias Regional Survey provides evidence for the limited role, if any, played by Aphrodisian marble—as opposed to Aphrodisian sculptors—in the international marble trade.

OBJECTIVES

This chapter, first, presents the results of a survey of ancient marble quarries in the territory of Aphrodisias and, second, reexamines in light of this new evidence the role that marble played in the social and economic life of Aphrodisias in the Roman period. A major aim of the Aphrodisias Regional Survey was to locate and document as many marble quarries as possible within the territory of the ancient city. This project was interdisciplinary in nature, combining archaeological and geological documentation of the quarries, along with chemical analysis of the marbles. Marble quarries were identified through field reconnaissance and with the help of local villagers and modern quarriers. Examination of high-resolution QuickBird Imagery and the General Directorate of Mineral Research and Exploration of the Republic of Turkey (MTA) 1:100,000 geological map of the region confirms the belief that the quarry survey has identified most of the major marble quarries within the territory of Aphrodisias.

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[115] J. Ward-Perkins, Marble in Antiquity (London 1992); C. Fant, "Quarrying and Stoneworking," in J. Oleson (ed.), Oxford Handbook of Engineering and Technology in the Classical World (Oxford 2008) 121–35.

The research program consisted of three separate activities: geological and archaeological documentation of the quarries; mapping of the quarries with the aid of GPS-equipped field computers, with the aim of producing estimates of the volume of stone removed; and a sampling program. Carola Stearns, research associate of the Kelsey Museum of Archaeology at the University of Michigan, carried out the geological documentation of the marbles.[116] Archaeological documentation consisted of studying all the features commonly associated with ancient quarries, including: the size of the quarry(ies); the quality of the marble[117] and the direction of joints and openings, which together determined the size of the largest possible block that could be extracted; texture, grain size,[118] and color(s); evidence of extraction, such as wedge holes and pickmarks; the presence of prefabricated blocks, spoil heaps, slipways, and other associated facilities; as well as the locations of the samples taken for isotopic analysis.

The analyses of the regional quarries presented in this chapter, together with the results of previous analyses of the City Quarries, constitute a complete isotopic database

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[116] C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).

[117] The quality of the stone is defined according to geological parameters, such as the mineralogical and textural composition, discontinuities in the bedding planes, spacing of joints within the rock, fractures that are either open or filled with recrystallized lenses of calcite, emery, and schist, and is discussed in greater depth by C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming). *High quality* is a subjective term used in reference to the largest pieces quarried, such the monolithic columns in the Hadrianic Baths (H: 5.4 m, Diam.: 0.7 m), column drums in the Temple of Aphrodite (H: 2.5 m, Diam.: 1.5 m), relief panels in the Sebasteion (H: 1.8 m, W: 1.5 m, D: 0.8 m), large sarcophagi (S-2: H: 121.5 m, W: 2.98 m, D: 1.42 m), and over-life-sized sculptures (H: 3 m). The longest blocks in Aphrodisias are the mottled blue and white monolithic columns in the Tetrakionion (H: ca. 6.5 m, Diam: 0.8 m).

[118] Grain size, which is the most common characteristic used to discriminate between marble sources, is classified as fine, medium, and coarse. The grain size of the City Quarries is discussed in L. Lazzarini, G. Ponti, M. Martinez, P. Rockwell, and B. Turi, "Historical, Technical, Petrographic, and Isotopic Features of Aphrodisian Marble," in L. Lazzarini (ed.), ASMOSIA VI (Padua 2002).

of all known Aphrodisian marbles.[119] Quarry-provenancing studies lay the groundwork for a more detailed investigation to fingerprint the building materials within the city. For this study, three to 13 samples were collected from each quarry, for a total of 60 quarry samples, plus 34 archaeological samples taken from buildings and sculptures from the city. The geology of the marbles is discussed by Stearns,[120] while the archaeological interpretation of the isotopic analysis is provided below.

ISSUES AND PROBLEMS

Marble was quarried widely in the Morsynus river valley in antiquity as it is today. Ancient and modern quarry sites are closely linked. Modern quarry workers use ancient quarries to help locate marble beds, a practice common across southwest Turkey.[121] Developments in quarrying technology and transportation methods, along with the recently growing international demand for fine construction materials, have contributed to a major increase in the exploitation of the regional marble beds.[122] The office of the Karacasu Administrative District, whose borders enclose most of the survey region,

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[119] The well-known City Quarries have already been documented archaeologically and geologically and have been sampled for isotopic analysis. For geological and archaeological documentation, see M. Joukowsky, Prehistoric Aphrodisias (Leuven 1988); N. Asgarı, unpublished report (1992); P. Rockwell and G. Ponti, "The Marble Quarries: A Preliminary Survey," in R. Smith and C. Roueché (eds.), Aphrodisias Papers 3. Journal of Roman Archaeology Supplementary Series 20 (Ann Arbor 1996) 81–103. For chemical and petrographic analysis, see L. Lazzarini, G. Ponti, M. Martinez, P. Rockwell, and B. Turi, "Historical, Technical, Petrographic, and Isotopic Features of Aphrodisian Marble," in L. Lazzarini (ed.), ASMOSIA VI (Padua 2002) 163–68.

[120] C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).

[121] The ancient quarries at Dokimeion have nearly been destroyed by modern quarrying activity.

[122] B. Yavuz, N. Turk, and M. Koca, "Geological Parameters Affecting the Marble Production in the Quarries along the Southern Flank of the Menderes Massif, in SW Turkey," Engineering Geology 80.3/4 (2005) 214–41.

estimates the workable marble reserves in the district to be 30,100,000 m^3.[123] Currently, there are six active quarry sites in the district, and their products are distributed both domestically and internationally. Residents of the valley informed us that an additional four now defunct quarries, all located near or on top of ancient quarries, were abandoned in the 1980s and 1990s.

In many ways, modern quarrying technology is less efficient than Roman methods. Cutting with power drills and diamond-studded wire saws along vertical and horizontal planes that ignore the natural fractures and folds of the marble beds generates enormous amounts of waste. The resultant visual pollution and the squandering of a nonrenewable resource are regrettable consequences of these methods. The investigation of ancient quarries also has special urgency, since the ubiquity of modern quarrying in Turkey threatens the preservation of ancient quarries as archaeological sites. Unfortunately, much of the evidence for ancient quarrying has been lost, making it difficult to know, among other things, the exact amount of stone removed in antiquity. This chapter presents at least a partial reconstruction of this ancient industrial landscape before it is entirely lost.

QUARRIES IN THE HINTERLAND OF APHRODISIAS

[123] T. C. Karacasu Kaymakamlığı Web site: http://www.karacasu.gov.tr/sg.asp?ID=254 (accessed June 1, 2008).

Geological and Topographical Description of the Quarries

The area around Aphrodisias is remarkably rich in marble. Ancient prospectors were able to identify and extract stone from nearly all the geological marble beds known today (Figs. 3.3, 3.4). In the absence of detailed knowledge of the principles of modern geology, ancient prospecting must have relied primarily on observation.[124] Quarry locations overlain on the MTA map show they were often opened at contact points between marble and other types of stone. In the City Quarries, vestiges of ancient quarry marks on the stratigraphic border between the marbles and adjacent quartzites indicate that the desired stone was exploited to the maximum extent.[125]

The regional survey has shown that Aphrodisias drew on eight further local marble quarries in addition to the well-known City Quarries. The quarries are discussed below according to their geographic location—north (City Quarries), west (**1**), south (**2–6**), and east (**7, 8**)—and are described in terms of geological characteristics (age, color, maximum block size) and evidence for exploitation (types, distribution, production evidence). The geological ages of the quarried marbles fall into two groups. Eight of the nine are Mesozoic, and the beds yielded white, white with varying intervals of gray, lenses of a dark blue, a purple-gray and white breccia as well as blue-gray and white mottle or breccia.[126] A single Paleozoic bed was quarried for mottled blue-gray and

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[124] J. Healy, Mining and Metallurgy in the Greek and Roman World (London 1978) 71–72.
[125] See C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming) for the geological interpretation. This feature has been observed previously in L. Lazzarini, G. Ponti, M. Martinez, P. Rockwell, and B. Turi, "Historical, Technical, Petrographic, and Isotopic Features of Aphrodisian Marble," in L. Lazzarini (ed.), ASMOSIA VI (Padua 2002) 164.
[126] The individual clasts in a mottled marble are less distinct than in a brecciated marble due to the degree of recrystallization.

white stone (**1**).[127] In the descriptions below, quarries with an extracted volume of less than 3,000 m^3 are called small; quarries up to 10,000 m^3 are called medium-sized; and all quarries larger than that are called large. Only two of the individual quarries in the City Quarries complex qualify as large; all the remaining individual quarries in the survey region are small or medium-sized. The volume estimates given in these introductory descriptions are further discussed and explained in the catalogue presented at the end of this chapter.

City (Northern) Quarries. The Northern Quarries, or City Quarries, located two km north of Aphrodisias, are the largest series of quarries in the valley and extend over a approximately one km^2 area of the Mesozoic Milas Formation.[128] They are clustered in groups on three adjacent hills, Taşkesiği, Ardıçlı, and Sarnıç; the largest group lies on Taşkesiği. In all three groups, medium-sized to large quarries are cut into the west side of a north–south oriented ridge at elevations about 700 masl. Approximately 55,000 m^3 of marble were extracted from the City Quarries. In places, the pickmarked quarry faces stand more than 20 m high. Spoil heaps line the perimeters of the largest quarries. The quarry faces exhibit medium-grained white and grayish white marbles interbedded with lenses of a fine-grained blue-gray marble, the last of which was found in large beds in the lowest quarry of the series. The topographic setting and close proximity of the quarries to the city were ideal; the heavy blocks were transported down a gentle gradient, and seasonal streambeds served as natural transportation routes.

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[127] For a further discussion of the geological significance, see C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming) on marble stratigraphy.

[128] P. Rockwell and G. Ponti, "The Marble Quarries: A Preliminary Survey," in R. Smith and C. Roueché (eds.) Aphrodisias Papers 3. Journal of Roman Archaeology Supplementary Series 20 (Ann Arbor 1996) 81-103.

Western Quarry. One Western Quarry was found, the Yazır Quarry (**1**) (Figs. 3.7, 3.8). It is geologically distinct from all the others, being Late Paleozoic in age and belonging to the Göktepe Formation. Located near the modern village of Yazır, it lies on the northwest side of a steep hill below a Late Classical citadel at an elevation of 919 masl, 11 km as the crow flies from Aphrodisias. The marbles here are mottled blue-gray and white and display little to no fracturing in the eastern and middle sections. The white areas range from medium to coarse grain, and the blue, fine to medium. The spacing between joints in the western section, the most fractured area, is about three m high and one m wide. Approximately 6,750 m^3 of marble were removed from the Yazır Quarry.

Southern Quarries. Five of the eight newly discovered quarries make up the Southern Quarries group. They are exposed along rolling hillslopes on the south side of the valley in an infertile and largely uninhabited zone as perhaps was the case in antiquity. Altogether, the five Southern Quarries produced approximately 55,000 m^3 of marble, equal to the amount produced in the City Quarries. In order of magnitude, the quarries are the Ören Quarries (**2**) (18,300 m^3), the Hançam Quarries (**3**) (13,450 m^3), the Çamarası Quarries (**4**) (9,150 m^3), the Kızıl Cağıl Quarries (**5**) (7,900 m^3), and the Nargedik Quarries (**6**) (5,950 m^3). These quarries lie at elevations ranging from 745 to 961 masl and are all small to medium-sized. The quarries at Kızıl Cağıl are five km as the crow flies from Aphrodisias, Ören 7.5 km, Çamarası nine km, Hançam ten km, and Nargedik 11 km.

The Southern Quarries are part of the same geological unit as the City Quarries, the Mesozoic Milas Formation, and the stone displays similar characteristics. It is a medium- to coarse-grained white marble, interlaced with lenses of gray marble of varying

widths, and infrequently displaying a gray-and-white mottled marble. Also interbedded with the dominant white marbles are lenses of a fine-grained blue-gray marble. It is important to note that the joint spacing is highly variable, however, and that the distance between the joints increases—and therefore the quality of the marble improves—at deeper levels. This variability may have impeded the development of the Southern Quarries, and none ever reached the size of the City Quarries, which provided higher quality marble more consistently.

Eastern Quarries. The two Eastern Quarries are the farthest away from Aphrodisias, and both produced colored marbles. The Baba Dağı Quarries (**7**), located on the south side of the saddle connecting the peaks of Ak Baba Dağı and Kara Baba Dağı at an elevation of 2,007 masl, are 17 km from Aphrodisias as the crow flies (Fig. 3.5). The medium- to coarse-grained marble found here is blue-gray and white and ranges from a mottled to a brecciated marble. Although the Baba Dağı marbles are thinly bedded and friable, the spacing of the joints made it possible to extract blocks more than three m long. Approximately 750 m^3 of marble were removed from the quarries. The Çamova Tepe Quarries (**8**) on the eastern side of Kara Baba Dağı lies at an elevation of 1,472 m, 22 km as the crow flies from Aphrodisias (Fig. 3.6). The marble is a medium-grained, purplish gray and white breccia; 3,000 m^3 of marble were taken from the area.

Colors of Aphrodisian Marble

Today, modern quarriers in the area around Aphrodisias extract white marbles tinted rose, green, purple, and yellow from the extensive Demirağlar Quarry, also above the village of Yazır, and black marble from a quarry near the village of Kırköy.

Aphrodisias followed Hellenistic and Roman norms in preferring white marble for most uses; by its nature, the gleaming white material capitalized on the play of light and shadows for great aesthetic effect. Colored marbles, however, had a different symbolic value, associated with the cost and effort of transporting recognizable materials over great distances. The use of certain special marbles, already well established in imperial architecture in Rome, became a phenomenon of provincial architecture in the second century A.D., when cities such as Carthage, Sardis, Ephesus, Sagalassos, and Pergamon made extensive use of famed colored marbles. The colored sources exploited by the Aphrodisians were targeted for their similarity to internationally distributed marbles found in the famous state-owned quarries at Dokimeion, the purple and white and the blue and white marbles.[129] The marbles from both Yazır and Çamova Tepe, of which the latter is virtually indistinguishable from the purple and white Dokiemion marble visually, were first used at Aphrodisias in the High Imperial period.[130]

That white marble was consciously targeted in most other quarries is evident upon close observation. As noted above, in the quarries on the south side of the valley, bands of fine-grained blue-gray marble are found together with deposits of medium- to coarse-grained white marble. Quarrying often stopped when the blue-gray marbles were exposed, as seen on a quarry face at Hançam Quarry 3.[131] The blue-gray marbles are

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[129] The blue and white marble from Dokimeion can be distinguished from the Yazır marbles in that the Dokimeion variety is more brecciated, and the blue and white colors are not as vivid. For types of marbles quarried in Dokimeion, see M. Waelkens, "Carrières de Marble en Phrygie," Bulletin des Musées Royaux d'Art et d'Histoire, Bruxelles (1982) 33–55.

[130] For a discussion of provincial distribution of international marbles, see C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy. Journal of Roman Archaeology Supplementary Series 6 (Ann Arbor 1993).

[131] Rockwell and Ponti, "The Marble Quarries: A Preliminary Survey," in R. Smith and C. Roueché (eds.), Aphrodisias Papers 3. Journal of Roman Archaeology Supplementary Series 20 (Ann Arbor 1996) 100–

visible on the surface in the areas between the various Hançam Quarries, and they were clearly passed over in favor of the white marble.

Quarry Types, Techniques, and Quality of the Stone

The quarries around Aphrodisias can be classified along a spectrum of types, ranging from large quarries cut directly into a hillside to small pits without an organized quarry face or floor (Figs. 3.9, 3.10). At Aphrodisias as elsewhere, the preferred practice was to quarry marble from a hillslope so extraction could expand both vertically and horizontally and so the quarries could grow appreciably.[132] Quarrying marble from level ground was less common but did occur in the pits at Nargedik, Ören, and Çamarası. These quarries never grew to a substantial size in part because of the difficulty of lifting material up and out of an increasingly deep pit.

A mixture of hillside and pit quarries could spread across a large area and were connected by slipways paved with marble working chips. The Ören Quarries, the second largest complex after the City Quarries, cluster into four main groups and include at least 20 small pits and medium-sized hillside quarries on two neighboring hills. At the Çamarası Quarries, five small pit and two medium-sized hillside quarries are scattered across a remote area of 1.5 km^2 (Fig. 3.11). At the Hançam Quarries, the third largest series in the valley, two small pit quarries are connected by slipways to three medium-sized hillside quarries, each measuring approximately 50 m by 20 m (Fig. 3.12).

101, observed this phenomenon in the largest of the City Quarries where the blue-gray marbles were tunneled around to follow the white marble beds.

[132] M. Waelkens, "The Quarrying Techniques of the Greek World," in M. True and J. Podany (eds.), Art Historical and Scientific Perspectives on Ancient Sculpture (Malibu 1990) 56.

The ten small pit quarries at the Nargedik Quarries were not worked as extensively as the other quarries on the south side of the valley, perhaps because the marble here was of a lower quality; due to the numerous fractures in the marble beds, only small blocks could be extracted (Fig. 3.13).[133] This quarry may have served a more local, countryside market or been useful for the production of smaller-sized petit appareil blocks, which were just as essential as larger blocks to the construction of the city. Yet even a small quarry could yield a sizeable block if the joint spacing was distant enough, as several blocks left at the quarries on Baba Dağı show (Fig. 3.14).

Extraction of stone was laborious and time-consuming. Experiments at Thasos suggest that it took 22 man hours to quarry a marble block measuring one-eighth of a cubic meter, while the extraction of a full cubic meter of softer limestone at Bois des Lens in Le Garde, France, took up to four days.[134] These experiments help to explain why, at Aphrodisias as elsewhere, the execution of major public buildings could span generations, as in case of the Sebasteion, which took nearly half a century to complete.[135]

The Aphrodisian quarries provide a vivid illustration of a number of well-known techniques, described and illustrated below.[136] The first stage in extraction involved prospecting for stone and selecting the desired quality of marble. The next step was to

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[133] The low quality of marble is best seen where a modern water channel was dug through the area, churning up only small chunks of marble.

[134] T. Kozelj, "Extraction of Blocks in Antiquity: Special Methods of Analysis," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 39; J.-C. Bessac, J. 'Abdul Massia, and Z. Valat, "De Doura-Europos à Aramel: Étude Ethno-archéologique dans des Carrièrs de Syrie," in P. Leriche and M. Gelin (eds.), Doura-Europos. Études IV, 1991–93 (Beirut 1997) 179–80.

[135] R. Smith, "The Imperial Reliefs from the Sebasteion at Aphrodisias," Journal of Roman Studies 77 (1987) 90.

[136] For the different techniques preferred in various ancient quarries, see T. Kozelj, "Extraction of Blocks in Antiquity: Special Methods of Analysis," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 31–36; C. Fant, "Quarrying and Stoneworking," in J. Oleson (ed.), Oxford Handbook of Engineering and Technology in the Classical World (Oxford 2008) 123.

remove the overburden of loose earth and top stone, which was usually damaged by weathering and lichens. Ancient quarrying techniques relied heavily on the spacing and direction of the natural veining and cracks in the bedrock. As much as possible, these were used to define the perimeters of blocks. Splitting stone along natural joints was the most common and efficient extraction technique and was widely used at Aphrodisias. The face of Çamarası Quarry 7 shows a side view of five steps that jut outward from the quarry face (Fig. 3.15); by following the subvertical joints in the stone, the quarriers were spared the arduous task of digging extra separating channels. They could remove the largest block possible with the least wastage, although the natural joints also governed the maximum sizes of blocks that could be obtained.

This ancient method of quarrying was far less wasteful than modern techniques, in which straight line drilling across the joints often causes large blocks to splinter along those natural folds as already mentioned. Also, by following the joints in the marble, internal flaws within the quarried blocks could be kept to a minimum, since the quarrying technique pushed the flaws toward the perimeter. The geological character of the Mesozoic marble at Aphrodisias, however, meant that defects within the block could not always be avoided. A number of the mythological relief panels in the Sebasteion and a handful of statues display fractures or internal cracks that were originally hidden in the block of stone and exposed only during carving.[137] In most cases, sculptors were able to disguise these flaws by confining them to the sides and backs of the blocks.

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[137] R. Smith, "The Imperial Reliefs from the Sebasteion at Aphrodisias," Journal of Roman Studies 77 (1987) 29.

The variable joint spacing observed in the quarries (from 0.5 m to 4.5 m) meant that sources for large blocks of white marble had to be carefully sought out.[138] It must have been difficult to quarry blocks for large-scale sculpture or for monolithic columns, which explains why the very largest marble elements are rarely white.[139] The fine-grained bluish gray marbles found in smaller lenses within the white marbles could produce quite long blocks, such as that suited for the "Blue Horse," which was carved out of a single block. The spacing between the joints in the Yazır Quarry was wide enough to allow for the extraction of the longest pieces ever used in the city, the 6.6 m monolithic columns of the Tetrakionion. In this respect, the marble from this quarry is the highest quality of any from the local quarries.

Once the outlines of a block had been determined, separation trenches were cut to a depth corresponding to the desired size of the block. Hançam Quarry 3 shows two nearly vertical separating trenches cut into the marble around a block that was never extracted (Fig. 3.16). In another part of the same quarry, a nichelike cutting in the quarry face preserves the process of removing a block (Fig. 3.17); separating trenches were cut on the sides and back to isolate the block, which was then removed from the trench, exposing the original channels of the separating trenches.

Cuttings for wedges are preserved in several of the regional quarries. In the case of the block described above, a series of metal wedges would have been inserted in a

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[138] N. Asgarı, unpublished report (1992).

[139] The only white marble monolithic columns at Aphrodisias are in the Tetrapylon (H: 5.6 m; Diam.: 0.6 m); all other white marble columns are composed of drums. P. De Staebler, "The City Wall and the Making of a Late Antique Provincial Capital," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008) 297, says that among the largest white architectural blocks are the spolia lintels from the Northwest and Northeast Gates in the City Walls, both of which were originally architraves (H: 1.12 m; L: 3.94 m; W: 0.71 m).

continuous line along the bottom face of the block; when the wedges were struck with a mallet, the block would break off.[140] Wooden wedges could also have been used; they would be inserted into the cuttings and then soaked with water, and the resulting expansion of the wood would cause the block to break free of the native rock. In one of the trenches in Ören Quarry 7, a regular line of fine-point chisel marks, one cm apart, remains on the interior of three sides of the separating channels (Fig. 3.18); these marks served to score the bottom of a block so that when pressure was applied, the block would break away along an even line.

Separating trenches could be cut at any angle, depending on the joints in the stone and the desired dimensions of the final block. In Hançam Quarry 2, a quarrier started to dig two parallel setting trenches and marked their outlines with erratic pickmarks (Fig. 3.19). The task seems to have been abandoned, perhaps because the 45º angle of the quarry face proved too difficult for the quarrier to work. In many instances, quarry workers extracted marble along the contours of a hillslope, working downward in steps from the high to the low points of the hill; after all the steps were shorn away, only a vertical quarry face was left. At the Yazır Quarry, a deep V-cut was made into the hillside so that the quarry had two steep, vertical faces, each more than 30 m high. The largest of the City Quarries also preserves two vertical faces more than 20 m high, which meet at a 90º angle. At Hançam Quarry 2, a thick marble deposit was followed below ground level to extract a series of similarly sized blocks (Fig. 3.20). At Ören Quarry 7, modern quarriers have exposed several ancient quarry floors at different levels with trenches that show blocks were removed in standard sizes (Fig. 3.21). This rare piece of

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[140] J. Adam, Roman Building (London 1994) 31.

evidence serves as a reminder that, because of later infilling or blocking of subterranean galleries, many quarries may in fact have been significantly larger than they now appear.

Emery Quarrying

A quarry at Kızıl Cağıl Tepe provides evidence for emery extraction in the territory of Aphrodisias.[141] Emery is a rock that consists of corundum, aluminum, and iron oxides; corundum is the hardest mineral after diamond. Sources are found throughout the Eastern Mediterranean, as well as in Armenia and India. In Greece, the main source is on the island in Naxos, and secondary sources are found on the islands of Paros, Sikinos, Herakleia, Ikaria, and Samos. In Turkey, emery sources are located along the Hermos and Maeander rivers and throughout the Menderes massif. Archaeological and literary evidence for the use of emery as an abrasive stone and as a sand or powder dates from the Late Neolithic to the Byzantine periods in the Aegean, Egypt, and the Near East. In classical antiquity, corundum was mined for use as an abrasive for cutting, piercing, drilling, engraving, and polishing marble and other hard stones.[142] Pliny the Elder (*HN* 36.51–54) mentions that sand found in rivers was used to operate saws for cutting thin slabs of marble revetment, and that Naxian whetstones were used to polish marble statues and to engrave gems.

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[141] Mineral identification carried out on samples by A. Boleti from active emery quarries in the valley indicate that the proportion of corundum is less than the 50% required to classify a metabauxite as an emery; A. Boleti, "The Use of Emery in the Bronze Age Aegean and Eastern Mediterranean: Methodological Approaches and Preliminary Results," in G. Kazazes (eds.), Proceedings of the 2nd International Conference on Ancient Greek Technology (Athens 2006) 276–83.

[142] Emery often occurs as a mineral in streambeds and beach sands because of its resistance to weathering. P. Rockwell, "Tools in Ancient Marble Sculpture," in R. Francovich (ed.), Archeologia delle Attivitá Estrattive e Metallurgiche (Florence 1993) 184; J. Humphrey, J. Oleson, and A. Sherwood, Greek and Roman Technology: A Sourcebook (London 1998) 199, 481.

The Roman governor of Asia L. Antonius Albus mentions emery (σμύρις) in an edict issued at Ephesus in A.D. 147, which prohibited marble sawyers from dumping emery into the harbor.[143] Ancient emery quarries have been discovered in the territory of Ephesus and large chunks were found within the city.[144] L. Robert noted that deposits were exploited around Ephesus by European companies at the turn of the twentieth century and near Aphrodisias at Körteke, the ancient town of Xystis on the west side of the Harpasus valley, and in Avdan, located between Aphrodisias and the plain of Tabae.[145] Today, emery (*zımpara taşı*) is mined in two areas around Aphrodisias, at Çamarası and Ören. The office of the Karacasu Administrative District estimates the geological reserves to be approximately 234,000 tons.

An emery quarry at Kızıl Cağıl Tepe appears to be ancient. The pit quarry, approximately 4.0 m deep and 5.0 m wide, is located near a series of small, undisturbed ancient marble quarries; the quarry face displays unmetamorphosed white breccias and metabauxite clasts, the latter rich in emery (Fig. 3.22). In several of the Mesozoic marble quarries on the south side of the valley, emery lenses are interbedded with white marbles in this fashion. Ancient quarriers obtained emery by digging away the surrounding material to free the metabauxite clasts. The large emery boulders observed on an abandoned road connecting Çamarası and Ören indicate that the material could have also simply been collected from the surface and broken into smaller chunks later. Emery tools have been found in archaeological contexts at Aphrodisias dating as early as the Bronze

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[143] SEG 19 (1963) 683; IvE 23.
[144] W. Vetters, "Ancient Quarries around Ephesus and Examples of Ancient Stone Technologies," in P. Marinos and G. Koukis (eds.), Engineering Geology of Ancient Words, Monuments and Historical Sites, vol. 4 (Rotterdam 1990) 2075; D. Crouch, Geology and Settlement: Greco-Roman Patterns (Oxford 2004) 228.
[145] L. Robert, À Travers l'Asie Mineure (Athens 1980) 339–42.

Age.[146] While no emery tools were discovered in the fourth century A.D. Sculptor's Workshop, several fragments of emery have been excavated in Roman levels elsewhere in the city.

Transport

After marble blocks had been roughed out at the quarry, they were transported to the construction site along earthen tracks or roads surfaced with marble scree.[147] The blocks would then be finished by skilled carvers at city workshops or building sites. Purpose-built roads associated with quarries are archaeologically attested at the quarries in Euboea, Mount Pentelikon, and most spectacularly in Egypt, in Pharaonic and Roman quarries in Aswan, the Northern Fayum, Mons Claudianus, and Mons Porphyrites. In the last case, evidence for a complex system of bollards for breaking and checking loads is preserved.[148] A milestone along the route from Mylasa to its port at Passala bears a bilingual Latin and Greek inscription that names Chresimus, a *procurator a marmoribus* and imperial freedman, in charge of repairing a number of roads by order of Domitian.[149] The inscription seems to attest a well-developed network of roads in Caria, some of which may have been built specifically for quarry use. But it remains enigmatic in many

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[146] P. Getz-Preziosi, "Stone Figurines" in M. Joukowsky, Prehistoric Aphrodisias (Leuven 1988) 228–29. Getz-Preziosi believed the metabauxite adzes at Aphrodisias were imports because the material was not then known to be available locally.

[147] M. Wurch-Kozelj, "Methods of Transporting Blocks in Antiquity," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 55–64.

[148] V. Maxfield and D. Peacock, The Roman Imperial Quarries: Survey and Excavation at Mons Porphyrites, 1994–1998, vol. 1 (Cairo 2001) 195–96.

[149] L. Robert, "Rapport Sommaire sur un Second Voyage en Carie," Revue Archéologique 2 (1935) 160–61; P. Herrmann "Chresimus, *Procurator Lapicidinarum*. Zur Verwaltung der Kaiserlichen Steinbrüche in der Provinz Asia," Tyche 3 (1988) 122–24. Chresimus is again named, this time as a *procurator lapicidinarum*, in another bilingual inscription for giving marble for a gymnasium at Tralles in the period of Nerva; CIL III 7146.

respects:[150] there are no archaeological reports for the route mentioned in the Mylasa to Passala milestone; the routes for transporting marble from other known imperial quarries in Asia Minor are at least 100 km away; road repair does not seem to have been a regular duty of stone quarry procurators; and until recently no imperial quarries were known in the province of Caria (see below).[151]

Even with a well-functioning road system, land transportation was still very expensive, as is reflected in the Late Roman period by the prices listed in Diocletian's Edict.[152] As discussed in chapter two, marble from quarries located in remote inland areas was considerably more expensive than marble from quarries on bodies of water; thus, prices were largely determined by the distance the marble had to be hauled overland. Pliny the Younger's request to Trajan for permission to build a canal from Lake Sophon to Nicomedia in order to carry various materials such as marble, grain, and timber, highlights the difficulties associated with land transportation.[153] Numerous shipwrecks carrying stone cargoes attest to the ubiquity of marble in maritime trade.[154]

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[150] A. Hirt, "Chresimus, *Procurator a Marmoribus* und der Strassenbau. Überlegungen zu Logistik und Transportwesen Kaiserlicher Steinbrüche," in H. Herzig and R. Frei-Stolba (eds.), Siedlung und Verkehr im Römischen Reich (Bern 2004) 115–34.

[151] For the quarry, located 70 km southwest of Aphrodisias at Göktepe, see D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 312–48. C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy. Journal of Roman Archaeology Supplementary Series 6 (Ann Arbor 1993) 166, believed that the red breccias from the nearby quarries of Iasos were a likely case for imperial control since the marble was exported and mentioned in the Price Edict.

[152] K. Erim and J. Reynolds, "The Copy of Diocletian's Edict on Maximum Prices from Aphrodisias in Caria," Journal of Roman Studies 60 (1970) 136.

[153] Pliny, Letters 10.41.

[154] A brief bibliography on shipwrecks with stone cargoes includes: P. Pensabene, "A Cargo of Marble Shipwrecked at Punta Scifo near Crotone," International Journal of Nautical Archaeology and Underwater Exploration 7.2 (1978) 105–18; M. Beykan, "The Marble Architectural Elements in Export-Form from the Şile Shipwreck," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 127–37; D. Carlson, "A Monumental Cargo: The Roman Column Wreck at Kızılburun, Turkey," Institute of Nautical Archaeology Quarterly 33.1 (2006) 3–10; J. Royal, "Discovery of Ancient Harbour Structures in Calabria,

Transportation to Aphrodisias from the City Quarries or the Southern Quarries would not have posed great logistical problems. The southwest plateau gently slopes down to the Morsynus river, which is easily forded at many points and deeply incised in only a few places. The topography of the Eastern and Western Quarries, however, presented additional challenges. At Yazır, marble scree was thrown down a steep hillside, and broken blocks fill the mountain stream below. Slipways, which are still visible above the stream level, indicate the blocks were moved out from the bottom of the quarry; quarrymen may have even used the mountainside stream for the transport of blocks (Fig. 3.23). At Baba Dağı, transport workers would have encountered great difficulty in maneuvering large blocks down the mountainside; the slope from the top to bottom of the quarries was 19º, or 38%. Possible transportation routes from the Yazır and Baba Dağı Quarries to Aphrodisias are illustrated in Figure 3.24.

Transportation from the more distant Western and Eastern Quarries, such as Yazır (11 km), Baba Dağı (17 km), and Çamova Tepe (22 km), would have incurred greater costs than the white marble sources nearer to the city. Colored marble from these quarries would still have been significantly less expensive, however, than imported stone hauled up the Maeander valley from the coast. Despite their marked similarity to Dokimeion marbles, the size of these quarries indicates that they were not exploited for more than a local or regional market.

Quarry Ownership and Organization

Italy, and Implications for the Interpretation of Nearby Sites," International Journal of Nautical Archaeology and Underwater Exploration 37.1 (2007) 160.

As detailed in chapter two, in the Greek and Roman era, marble quarries could be owned by wealthy landowners, urban communities, or the state. They could be operated by private individuals, leased out to entrepreneurs, or worked at specific times for specific buildings.[155] The scale of imperial building in the Roman period led to state takeover of certain special quarries, and by the second century A.D., a huge luxury trade overseen by imperial officials revolved primarily around state-owned marbles, which were the most prestigious choice for imperial, civic, and private buildings alike.[156]

From Aphrodisias itself, there is no direct evidence for the ownership or organization of the quarries, but they likely belonged to the municipality or to members of the civic elite, or a combination of both. A second century A.D. inscription, which may be related to marble quarrying activities, names two slaves who acted as agents (*pragmateutai*) representing the interests of the Roman equestrian Antonius Celsus; they dedicated an altar and incense burner to Zeus Thynnaretes, whose epithet reflects a place-name attested as an earlier name of Synnada, near Dokimeion in Phrygia.[157] A. Chaniotis believes that Celsus's agents may have come to Aphrodisias from Synnada, and that their presence in the city could be explained by the importance of the marble-quarrying industries in both places. The large imperial quarries, such as those in Phrygia, are known to have been centers of technological innovation, and both Dokimeion and Aphrodisias were affiliated with sculptural workshops.[158] Nevertheless, Chaniotis allows

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[155] Justinian, Digest 8.13, discusses an owner's rights for leasing out a quarry on private land; A. Burford, The Greek Temple Builders at Epidauros (Liverpool 1969).
[156] J. Ward-Perkins, Marble in Antiquity (London 1992) 22–30; M. Waelkens, "Cave di Marmor," Enciclopedia dell'Arte Antica, Classica e Orientale. Secondo Supplemento (Rome 1994) 71–88.
[157] A. Chaniotis, preliminary report (2002), I02.179.
[158] A. Hall and M. Waelkens, "Two Dokimeian Sculptors from Iconium," Anatolian Studies 32 (1982) 151–55; M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in

that his suggestion remains conjectural, and Celsus's agents may not have had anything to do with the local marble industry.

It is notable that in all the Aphrodisian quarries, there is little remaining evidence of manufacturing. While it is conceivable that all material was salvaged from the quarries in later periods, even at the more isolated quarries only a small number of blocks remain at the quarry site. The several broken blocks left in debris piles and along transportation routes, such as an abandoned sarcophagus near Çamarası and the dozen blocks left on the mountainside at the Baba Dağı Quarry, are among the few pieces still found in the regional quarries (Figs. 3.14, 3.25). The evidence from within the quarries suggests that products were roughed out on site, then delivered to and finished within the city, and underlines that a close working relationship existed between the quarries and the architectural and sculptural workshops within the city. Yet quarrying never reached the scale that Ward-Perkins observed in the international quarries, where a high demand for stone resulted in the large-scale production, prefabrication, and abandonment of materials at the quarry site.[159]

Quarry Volumes and Marble Production

The City Quarries were an important source of marble because of both the high quality of stone they produced and ease of transport to the city; but as Asgarı first suggested more than 15 years ago, the City Quarries are too small to have provided

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Trajan's Forum at Rome," American Journal of Archaeology 89 (1985) 641–53; M. Waelkens, P. De Paepe, and L. Moens, "Quarries and the Marble Trade in Antiquity," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 19.

[159] J. Ward-Perkins, Marble in Antiquity (London 1992) 25–26.

Aphrodisias with all the marble it used.[160] This section presents figures on the amount of marble removed from the ancient quarries and reconciles them with the amount of marble consumed within the major civic monuments. While all these figures are estimates, quantitative analysis helps to give an idea about the magnitude of demand within the city.

The volume of stone removed from the largest quarries was estimated using two methods. First, simple measurements were taken of the height (H), width (W), and depth (D); the volume was defined as HWD/2. From north to south, the volumes of the largest quarries on the Taşkesiği ridge measure 5,000 m^3, 6,200 m^3, 19,000 m^3, 2,700 m^3, and 21,000 m^3. The second, more detailed method was to measure the southernmost and largest quarry of the City Quarry series with a GPS-equipped field computer, recording a series of continuous points over its entire surface. Next, measurements of the modern contours of the hill around the quarry were used to model the original surface of the hillslope before the quarry was opened. The volume of stone removed was determined by comparing the landscape before and after excavation of the quarry in a cut and fill operation in ArcGIS. This produced a figure of 24,000 m^3. Since the numbers provided by the simple and detailed methods for the largest individual quarry were comparable, only the simple method was used to estimate the volumes of the other quarries.

The spoil heaps deposited on the perimeter of the City Quarries give some idea of how much of the stone removed from the quarries was lost as waste (Fig. 3.26). Scholars have estimated that the final product of an ancient quarry represents between 10–30 per

[160] N. Asgarı, unpublished report (1992).

cent of the total amount of stone extracted.[161] To obtain estimates of wastage from the largest of the City Quarries, measurements were made of the five spoil heaps that surround it.[162] The wastage present in the spoil heaps alone is estimated at nearly half of the estimated volume ever removed from the quarry: 9,000 m^3 of wastage out of 21,000 m^3 extracted. I estimate that the total quarried volume from all the City Quarries was approximately 55,000 m^3, and by a very conservative estimate (a 2:1 or 3:1 ratio of usable to extracted marble), the total output capacity of finished products from City Quarries was ca. 20,000 to 25,000 m^3.[163]

From these numbers alone, it is clear that Aphrodisias required further marble resources to meet the demands of civic and private construction. The outer face of the Late Antique City Wall, which is substantially composed of blocks reused from Roman tombs, alone consumes about 25,000 m^3 of marble, while the core and inner face of the wall required another 75,000 m^3 of rubble and petit appareil blocks, far beyond the total estimated capacity of the City Quarries.[164] The total amount of marble used in the city's largest Imperial-era building projects, the Stadium and the sanctuary of Aphrodite, are

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[161] R. Lambertie, L'Industrie de la Pierre et du Marbre (Paris 1962); J. Röder, "*Marmor Phrygium*. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Instituts 86 (1971) 253–312, believes only one-fifth of the quarried stone was ever used, while D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009), believe this estimate is too conservative and that the total was probably closer to one-fourth or one-third. Wastage in modern quarries consumes about 85 per cent of the quarried stone.

[162] The spoil heaps were measured using the GPS field-equipped computer. Continuous points taken along the uppermost contours and bottom of the spoil heaps allow for this estimate.

[163] The largest quarries are likely to be larger than they now appear to be. Marble scree has filled the quarry floors so that the original depth is difficult to ascertain.

[164] P. De Staebler, "The City Wall and the Making of a Late Antique Provincial Capital," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008) 288, 294.

estimated at ca. 6,000 m^3 and 3,300 m^3, respectively.[165] The major architectural pieces in the North Agora consumed ca. 3,000 m^3, the Bouleuterion 400 m^3, the Sebasteion 1,000 m^3, the South Agora 2,000 m^3, the Civil Basilica 2,000 m^3, the Theater 2,000 m^3, the Theater Baths and Tetrastoön 400 m^3, and Hadrianic Baths 300 m^3. The volume consumed for at least 1,000 sarcophagi known to have been produced through the Imperial period totals 2,700 m^3, and the estimated number of portrait statues would have required 1,000 to 2,500 m^3.[166]

The estimate of the total volume of all marble obtained from the known territorial quarries is approximately 120,000 m^3. This too represents only a fraction of the amount of stone actually extracted, since the known quarries may have been larger in antiquity than I was able to measure—because of destruction by modern quarrying or because the pits have been partly filled in. At the same time, however, the measurement of ca. 125,000 m^3 for the marble used in the monuments listed above represents only a fraction of the marble used in the city—for example, it does not include residential or extramural construction—and only a fraction of the marble that would have had to be quarried, allowing for a proportion of waste to usable stone of 2:1 or 3:1. While it is difficult to resolve our estimates of stone used in the city with the stone extracted from the regional quarries, the latter is not so much greater than the former that quarrying for export would

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[165] I thank P. De Staebler for providing estimates for the City Wall and the Stadium, C. Ratté for the North Agora, P. Stinson for the Civil Basilica, and H. Turnbow for the sarcophagi.

[166] For calculating the total volume of all sarcophagi, Turnbow in this volume estimates 2.68 m^3 per sarcophagus since the standard measurement of an average-sized sarcophagus is H: 1.32 m, W: 2.15 m, and D: 0.95 m. R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 9–13, have estimated that ca. 1,000 to 2,500 portrait statues were created throughout 250 years in the history of the city. The average portrait statue consumes 1 m^3 of marble based on the following measurements: H: 2.10 m, W: 0.80 m, and D: 0.6 m. The estimate is based on the higher proportion of marble consumed because statue bases on which the statues stood and other types of sculptures were not considered.

be implied. Additionally, the rate of sculptural production and the number of artisans active in the sculptural workshops suggest that the small cohort of local sculptors outnumbered an even smaller group of Aphrodisian craftsmen working away from home. In the absence of clear evidence for export, it seems more likely that the local marble industry was largely self-contained, with most nearby sources being quarried for local uses.

Archaeological Interpretations of Stable Oxygen and Carbon Isotope Analyses

60 samples from the eight ancient and two modern marble quarries and 34 samples from buildings and sculptures at Aphrodisias were analyzed in the Stable Isotope Lab in the Department of Geological Sciences at the University of Michigan under the direction of K. Lohmann.[167] Samples from the ancient quarries were taken from outcrops close to the ancient workings to ensure that they came from the same strata quarried in antiquity.

The results show two characteristic signatures for Aphrodisian marbles, which are listed in Table 3.1 and shown in cross plots sorted by quarry and by marble color (Figs. 3.27, 3.28). The stable isotope values provided are expressed as $\delta^{13}C$ and $\delta^{18}O$ in per mil relative to the PDB standard. As described by Stearns in "Geoarchaeological Investigations," the carbon values for the samples from all the quarries in the Mesozoic marble cluster together near 2‰, ranging from 1.0 to 2.5‰, while the oxygen values range from -2.5 to -4.5‰. The $\delta^{13}C$ and $\delta^{18}O$ isotopic values for the white marble

[167] Sampling and laboratory methods are detailed by C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).

samples from the Mesozoic quarries overlap with previously published samples collected from the City Quarries.[168] The carbon values for most of the blue-gray Mesozoic marbles are more negative, with values ranging from near 0 to -3.0 ‰. The breccia float from the weakly metamorphosed marbles of the Baba Dağı Quarries have carbon values very near 0‰. The second characteristic isotopic signature is seen only in the Late Paleozoic marbles from the Yazır Quarry and is distinct in both carbon, with values near 4 to 5‰, and oxygen, with values between -7 and -10‰.[169]

The archaeological sampling program, shown in Table 3.2 was undertaken to determine whether the stone from buildings and statues with secure dates and archaeological contexts could be traced to individual quarries. In particular, samples were collected from a number of buildings with mottled blue-gray architectural elements to determine whether this stone is chemically similar to the visually very similar marble from Yazır (Fig. 3.29). The samples taken from the mottled blue-gray architectural blocks all fall within the same unique range of $\delta^{13}C$ and $\delta^{18}O$ values as the samples from the Paleozoic quarry at Yazır (Fig. 3.30). These include the pedestals and monolithic columns from the palaestra of the Hadrianic Baths, the monolithic columns from the Antonine to Severan Tetrapylon, and the columns reused in the Theater Baths, the Tetrastoön, and the structures known as Gaudin's Gymnasium and Fountain. While it is of course possible that one or more still undiscovered sources of the same stone were quarried in antiquity, it seems likely that Yazır was the primary source of the blue-gray

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[168] L. Lazzarini, G. Ponti, M. Martinez, P. Rockwell, and B. Turi, "Historical, Technical, Petrographic, and Isotopic Features of Aphrodisian Marble," L. Lazzarini (ed.), ASMOSIA VI (Padua 2002).
[169] See C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming) for the geological explanation of the isotopic values.

mottled marble widely used at Aphrodisias from the early second through the third century, especially given that the volume of the quarry exceeds the volume of architectural elements used in these six buildings.

Carbon and oxygen isotopic analyses cannot be used to distinguish between the eight different Mesozoic marble quarries now known (City Quarries, Ören, Hançam, Çamarası, Kızıl Cağıl, Nargedik, Baba Dağı, and Çamova Tepe). The white, medium- to coarse-grained marble used in the majority of the monuments and sculptures at Aphrodisias could have originated in any of the regional quarries in the valley.

The veins of blue-gray interbedded with the Mesozoic white marbles do, however, have different isotopic signatures, as already observed (see Fig. 3.28).[170] Only at Çamova Tepe does the purple-white breccia have the same signature as the white marble, which is also the same as that of the other Mesozoic white marbles in the Morsynus valley ($\delta^{13}C$: 2.18 to 2.80‰; $\delta^{18}O$: -2.66 to -4.36‰). Throughout the valley, however, the fine-grained blue-gray marbles display $\delta^{13}C$ values appreciably lower (2.28 to -2.75‰) than those of the medium- to coarse-grained white marbles (2.80 to 1.31‰) as well as $\delta^{18}O$ values in a smaller range (-2.48 to -3.52‰, as opposed to -2.53 to -5.93‰). Stearns attributes the darker color and more negative carbon values to the organic carbon content present in these marbles.[171]

Among the specific monuments included in Fig. 3.31, the isotopic values from the "Blue Horse" match a sample of blue-gray marble taken from the City Quarries; the 2.30

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[170] L. Lazzarini, G. Ponti, M. Martinez, P. Rockwell, and B. Turi, "Historical, Technical, Petrographic, and Isotopic Features of Aphrodisian Marble," L. Lazzarini (ed.), ASMOSIA VI (Padua 2002) 166–68.
[171] C. Stearns,"Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).

m long block from which the horse was carved was probably obtained from the large beds of blue-gray marble that overlay the white marble on the Taşkesiği ridge of the City Quarries. No beds of blue-gray marble as large as those in the City Quarries were observed in any of the newly discovered quarries. Samples of the medium- to coarse-grained white marble taken from the first-century relief panels of the Sebasteion (Centaurs, Herakles and Nessos, Dioskouros, Claudius and Britannia),[172] the second-century statue of a priest wearing a crown from the Theater (the ex-Demos),[173] the late-third-century Boxer Candidianus,[174] and second-century statue of priest wearing a crown[175] all fall within the range of the Mesozoic marble signature.

Isotopic analysis alone cannot distinguish Aphrodisian white marble from several other major white sources traded in antiquity. The quarries at Carrara in Italy, Paros in Greece, and Proconnesos, Dokimeion, and Göktepe in Turkey all have isotopic signatures that overlap with those of Aphrodisias (Fig. 3.32).[176] The signature of Aphrodisian marble covers a wide area, which makes provenancing materials originating from these regions by this method alone even more problematic. In addition, our survey, which

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[172] R. Smith, "The Imperial Reliefs from the Sebasteion at Aphrodisias," Journal of Roman Studies 77 (1987) 88–138.
[173] See R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 177–79.
[174] R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 147–49, bibliography; J. Van Voorhis, "Two Portrait Statues of Boxers and the Culture of Athletics at Aphrodisias in the Third Century C.E." in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008) 231–52.
[175] The "Ex-Demos" from the Theater; see R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 177–79.
[176] N. Herz, "The Carbon and Oxygen Isotopic Database for Classical Marble," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 305–14; L. Moens, P. De Paepe, M. Waelkens, "Multidisciplinary Research and Cooperation: Keys to a Successful Provenance Determination of White Marble," in M. Waelkens, N. Herz, and L. Moens (eds.), ASMOSIA II (Leuven 1992) 247–52; C. Gorgoni, L. Lazzarini, P. Pallate, and B. Turi, "An Updated and Detailed Mineropetrographic and C-O Stable Isotopic Reference Database for the Main Mediterranean Marbles Used in Antiquity," J. Herrmann, N. Herz, and R. Newman (ed.), ASMOSIA V (Boston 2002) 115–31.

covered 475 km^2, shows that similarly aged marbles within the same geological formation can give identical signatures. Because the Menderes massif stretches approximately 100 km to the southwest of Aphrodisias, it is possible that other quarries within the formation give similar signatures; indeed, this is the case with the marbles from the Göktepe quarries, 70 km southwest of Aphrodisias. Regional reconnaissance as a methodology is an essential tool in quarry surveys. The isotopic signature of the mottled blue-gray and white marble from the Yazır Quarry, however, is unique in comparison with other marbles in the valley. If a similar stone were seen at another site, its identity could be easily confirmed through isotopic analysis.

Because of the overlapping isotopic signatures of most of the marbles, the use of isotopic analysis alone does not suffice to match marble samples with marble sources; a multi-method statistical approach may bring us closer to this goal.[177] Petrographic, strontium isotopic, trace element, and paramagnetic resonance spectroscopic analyses of the samples from the regional quarries are currently in progress. It is hoped the results will make it possible to distinguish between the Mesozoic white marbles from the region as well as between Aphrodisian white marbles and white marbles from other sources.

MARBLE USE AT APHRODISIAS

Marble was used in the tombs, settlements, and rural fortifications of pre-Hellenistic and Early Hellenistic Aphrodisias and environs, but large-scale quarrying did

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[177] D. Attanasio, Ancient White Marbles: Analysis and Identification by Paramagnetic Resonance Spectroscopy (Rome 2003).

not begin in earnest until the later first century B.C., with the construction of the Temple of Aphrodite and a number of other buildings associated with the patronage of the Late Hellenistic and Augustan local notable, C. Julius Zoilos.[178] The development of Aphrodisias continued at a rapid pace until the mid-third century A.D., and then slowed considerably in the following centuries. That the local craft tradition was held in high repute is attested by the public sculpture competitions held within the city, the signatures of master artisans, the depiction of a portrait carver on a sarcophagus, and the wealth and variety of sculptures found within the sculptor's studio.[179]

The monuments of Aphrodisias are composed primarily of white marble, alongside local blue-gray marble, limestone, quartz, and schist. As discussed above, the white marble seems to have come largely from the local quarries, and most quarry products appear to have been earmarked for local building projects and statue monuments. The fine-grained blue-gray marbles were also used for architectural members and special commissions, such as the "Blue Horse." The Yazır Quarry, whose isotopic signature is described above, supplied the city with the mottled blue and white marble used for monolithic columns for both civic and monumental private building projects.[180] Select

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[178] For a concise presentation of the urban development of Aphrodisias, see the two articles by C. Ratté, "The Urban Development of Aphrodisias in the Late Hellenistic and Early Imperial Periods," in C. Berns, V. Hesberg, L. Vandeput, and M. Waelkens (eds.), Patris und Imperium (Leuven 2002) 5-32; C. Ratté, "New Research on the Urban Development of Aphrodisias in Late Antiquity," in D. Parrish (ed.), Urbanism of Western Asia Minor. Journal of Roman Archaeology Supplementary Series 45 (Portsmouth, RI 2001) 116-47.

[179] P. Rockwell, "The Sculptor's Studio at Aphrodisias: The Working Methods and Varieties of Sculpture Produced," in Y. Eliav, E. Friedland, and S. Herbert (eds.), The Sculptural Environment of the Roman Near East (Leuven 2008) 91–116; K. Erim and C. Roueché, "Sculptors from Aphrodisias: Some New Inscriptions," Papers of the British School at Rome 50 (1982).

[180] These buildings include the Tetrapylon, Theater Baths, Tetrastoön, Gaudin's Gymnasium, Gaudin's Fountain, Hadrianic Baths, Tetrakionion, Triconch House, Atrium House, and the Temenos of the Temple of Aphrodite.

sculptures and architectural elements were made out of freshly quarried stone as late as the late fifth or early sixth century A.D.

In its exploitation of local marble resources, Aphrodisias resembles a number of other nearby cities. At Ephesus, groups of at least seven different quarry zones have been located ten to 25 km northwest of the city.[181] At Hierapolis, local limestones were quarried close to the city, while an extensive series of quarries in the region of modern Denizli supplied marble to both Hierapolis and Laodikeia ad Lycos.[182] At Sagalassos, eight limestone quarries were opened in the immediate vicinity and up to 25 km away; certain of these limestone quarries were prized for their close resemblance to marble, as shown by an honorific inscription that mentions the "local marble of Sagalassos" and asserts that it could easily be confused with the Phrygian stone from Dokimeion.[183]

One might wonder why so many white marble quarries were opened up on the south side of the valley despite the fact that the City Quarries were so extensive and were apparently never exhausted; several crosses and a fifth-century Christian prayer inscribed on the face of the southernmost quarry suggest that the quarries were active well into late antiquity. Possibly the authorities responsible for the City Quarries, whether public or private, were simply not able to keep up with the demand for stone during the peak period of the urban development of Aphrodisias in the first and second centuries A.D. If

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[181] D. Monna and P. Pensabene, Marmi dell'Asia Minore (Rome 1977) 127–44; W. Alzinger, "Ritzzeichnungen in den Marmorbrüchen von Ephesos," Jahreshefte des Österreichischen Archäologischen Instituts in Wien 48 (1966–1967); W. Vetters, "Ancient Quarries around Ephesus and Examples of Ancient Stone Technologies," in P. Marinos and G. Koukis (eds.), Engineering Geology of Ancient Words, Monuments and Historical Sites, vol. 4 (Rotterdam 1990).

[182] D. Monna and P. Pensabene, Marmi dell'Asia Minore (Rome 1977) 81–85. Alabaster from Hierapolis was exported to regional and international markets; G. Scardozzi, "Ancient Marble and Alabaster Quarries near Hierapolis in Phrygia (Turkey)," ASMOSIA IX (Tarragona 2009).

[183] P. Degryse, T. Heldal, E. Bloxam, P. Storemyr, M. Waelkens, E. Trogh, H. Vanhaverbeke, J. Poblome, and P. Muchez, "The Sagalassos Quarry Landscape," QuarryScapes (2007); Roman writers did not explicitly distinguish between marble and other types of fine-grained stone.

the marble supply was in the hands of private entrepreneurs, this would have led to a rise in prices, making it cost effective to bring marble from much farther away, even in spite of the added expenses of transport. The marbles from Yazır, Baba Dağı, and Çamova Tepe, however, were selected for their unique color properties. In particular, the marbles from Yazır and Çamova Tepe resembled the internationally famous colored marbles from Dokimeion and enabled local builders to achieve with local stone the same effect that other cities at did at great expense with imported materials.

Larger cities such as Ephesus or Sardis and cities closer to major trade routes such as Hierapolis imported far greater quantities of stone than Aphrodisias, and this was not because they did not have alternative local sources. Inscriptions boasting of the origins of columns from imperial quarries, which adorned public edifices at Ephesus, Hierapolis, Pergamon, Sardis, Sagalassos, and Smyrna, signaled acclaim both for the benefactors and the city.[184] At Aphrodisias, imported architectural marbles are comparatively rare. Colorful marble revetment, popular in the decoration of both civic monuments and private houses, exhibits the normal, if more limited, range of international imports,[185] but

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[184] C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy. Journal of Roman Archaeology Supplementary Series 6 (Ann Arbor 1993) 152–57. For the range of marbles in a private context at Ephesus, see K. Koller, "Marmorausstattungen," in H. Thür (ed.), Das Hanghaus 2 in Ephesos. Die Wohneinheit 4. Forschungen in VIII/6 (Vienna 2005) 144–51. For Hierapolis, see D. Attanasio and P. Pensabene, "I Marmi del Teatro di Hierapolis," Hierapolis. Scavi e Ricerche 4 (Rome 2002). For Sardis, see F. Yegül, The Bath-Gymnasium Complex at Sardis (Cambridge 1986). For Sagalassos, see M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, and P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (Boston 2002) 370–80.

[185] C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy. Journal of Roman Archaeology Supplementary Series 6 (Ann Arbor 1993) 145–70, n. 67, notes that at Aphrodisias, marbles from Chios, Carystos, Dokimeion, Iasos, Mons Porphyrites, Sparta, Taenaros, and Teos, was found in a cleanup on the western end in the pool in the Portico of Tiberius, the source presumably being the nearby Hadrianic Baths. In the Civil Basilica, ongoing excavations have uncovered fragments of marbles from Carystos, Chalcidicum, Chios, Dokimeion, Hierapolis, Iasos, Skyros, Sparta, Taenaros, and indeterminate varieties from Bythnia (perhaps *breccia corallina, marmor triponticum,* or *breccia di Hereke*). Found in Late Antique domestic structure (NES

very few large-scale architectural elements of imported stone have been found. Also, apparently all the sarcophagi preserved at Aphrodisias were carved in local stone; recent isotopic analysis has shown that even a garland sarcophagus of a type manufactured in Dokimeion was produced as an imitation in local stone.[186] This same material self-sufficiency is evident in other aspects of the city's economy. Olive oil production tended toward subsistence levels rather than trade-level production.[187] Ceramics also show a predominance of locally made fabrics.[188]

There are multiple explanations for Aphrodisias's minimal participation in international trade in comparison with relatively nearby cities, such as Sardis and Ephesus. It is more remote than these and many other cities, and is situated neither on the coast nor on a major road. The western stretches of the road built by M. Aquillius in the Republican period from Ephesus to Apameia in Syria followed the Maeander valley and bypassed Aphrodisias by 40 km to the north.[189] Neither the shallow Morsynus nor

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2006) were fragments of marbles from Carystos, Chios, Dokimeion, Hierapolis, Mons Porphyrites, Numidia, Skyros, Sparta, Taenaros, and Thessaly. Excavations in the North Agora (NAg 03.2) uncovered fragments of marbles from Carystos, Iasos, Sparta, Teos, and Thessaly. From the Bouleuterion came marbles from Carystos, Dokimeion, Hierapolis, Taenaros, Teos, and Thessaly. The Temple-Church excavations exposed marbles from Carystos, Dokimeion, Iasos, Sparta, and Teos. A number of contexts preserve the local colored marbles from Yazır and Çamova Tepe.

[186] R. Smith, "Sarcophagi and Roman Citizenship," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008) 349. There are more than 90 whole sarcophagi, 50 lids, and 320 large fragments; for comparanda, see pls. 1.1, 3.1–3. For similar sarcophagi from near Çanakkale, Iznik, and Antalya, see M. Waelkens, Dokimeion: Chronologie und Typologie ihrer Produktion (Berlin 1982).

[187] I. Lockey, "Evidence for Ancient Olive Oil Production and Rural Settlement," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).

[188] P. De Staebler, "Roman Pottery," in C. Ratté and P. De Staebler (eds.), Aphrodsisias V: The Aphrodisias Regional Survey (Mainz forthcoming); N. Hudson, "Three Centuries of Late Roman Pottery at Aphrodisias," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008), also notes the relative absence of imported fine wares at Aphrodisias in Late Antiquity.

[189] D. French, "The Roman Road-System of Asia Minor," Aufstieg und Niedergang der Römischen Welt II 7.2 (New York 1980) 707.

even the Maeander itself, a river renowned for its muddy waters and tortuous route, were adequate for water-based transportation.[190]

The exploited natural resources of Aphrodisias, while apparently adequate to support the population of the Roman-period city in a grand style, were not so extensive that they could be profitably exported. The regional quarries at Aphrodisias cover a small fraction of the area, about two km^2 of exploited land in total, compared with the state-owned quarry at Proconnesos (40 km^2).[191] At Dokimeion, approximately 500,000 m^3 were removed from the main quarrying site at Bacakale as compared with 120,000 m^3 from all of the quarries at Aphrodisias.[192] The local medium- to coarse-grained white marble does seem to have been transported in small amounts to marble-poor sites such as Sagalassos, where the marble of two sculptures of Dionysos displayed in the nymphaeum in the Upper Agora has been analyzed as Aphrodisian. Yet Aphrodisian workshops played a marginal role in the entire sculptural assemblage at Sagalassos, taking a back seat to the Dokimeion workshops that outfitted the city with most of its marble sculpture and architecture.[193] Finally, for most of its history, Aphrodisias remained relatively small

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[190] Strabo Geography 12.8; Pliny Natural History 5.113. It is generally believed that marble coming from Dokimeion was transported along an overland route through the Maeander valley, rather than on the river itself. See M. Waelkens, "Carrières de Marble en Phrygie," Bulletin des Musées Royaux d'Art et d'Histoire, Bruxelles (1982) 199 n. 35; M. Waelkens, P. De Paepe, and L. Moens, "Quarries and the Marble Trade in Antiquity," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 90 n. 45; M. Christol and T. Drew-Bear, "De Lepcis Magna à Aizanoi: Hesperus Procurateur de Phrygie et l'Administration des Carrières de Marbre," in J. Desmulliez and C. Hoet-Van Cauwenberghe (eds.), Le Monde Romain à Travers l'Épigraphie: Méthodes et Pratiques (Lille 2005) 199 n. 35.

[191] N. Asgarı, "The Roman and Early Byzantine Marble Quarries of Proconnesus," in E. Akurgal (ed.), Proceedings of the 10th International Congress of Classical Archaeology (Ankara 1979) 467–80.

[192] M. Waelkens, "Technique de Carrière, Préfaçonnage et Ateliers dans les Civilisation Classiques (Mondes Grec et Romain)," in M. Waelkens (ed.), Pierre Éternelle du Nil au Rhin. Carrières et Prefabrication (Brussels 1990) 53–72.

[193] M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, and P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (Boston 2002) 373–74; S. Mägele, Die plastischen Bildwerke von Sagalassos, Ph.D. dissertation (Cologne 2009) 52–72.

and administratively unimportant, until it became a provincial capital in the Late Antique period.

APHRODISIAS AND GÖKTEPE MARBLE

An exception to the general rule that white marble was not imported to Aphrodisias is a distinctive, fine-grained stone preferred for Late Roman sculpture.[194] Until recently, scholars have variously assigned this stone to local Aphrodisian sources or to Dokimeion. No lenses of fine-grained white marble were observed in any of the quarries studied by the Aphrodisias Regional Survey team; the entire observed range of Aphrodisian white marble is medium to coarse grained. Recent research by an Italian team on a series of quarries near the modern village of Göktepe, 70 km southwest of Aphrodisias, has suggested the area as an alternative to Dokimeion as a source for this stone.[195] The quarries at Göktepe are divided into four different districts; of these, two produced a fine-grained black marble, a third produced a fine-grained white marble, and the fourth exploited black-and-white bichrome seams in the marble. The total quarried volume is approximately 40,000 m^3, which the authors translate to a usable volume of approximately 10,000 m^3.

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[194] Petrographic analyses on 32 samples showed that the maximum grain size (MGS) in white varieties ranges from 0.64 to 4.04 mm. The blue-gray colors have a smaller grain size. L. Moens, P. Roos, J. De Rudder, J. Hoste, P. De Paepe, J. Van Hende, R. Marechal, and M. Waelkens, "White Marble from Italy and Turkey: An Archaeometric Study Based on Minor- and Trace-Element Analysis and Petrography," Journal of Radioanalytical and Nuclear Chemistry 123 (1988) 333–48; R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 29.

[195] D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 313–48. I am grateful to the authors for including me on a trip to these quarries in 2008 and for subsequent conversations.

The team has conducted an extensive program of sampling and analysis of the marbles from the site. The analytical methods employed include carbon and oxygen isotope analysis, electron paramagnetic resonance (EPR), and petrographic examination. The results of these analyses have been subjected to statistical analysis and compared against a database of different marbles used in antiquity. The combination of weak EPR intensity indicative of a low manganese concentration, the fine grain size, and visible yellowish calcitic cross-shaped inclusions provides a distinctive signature for at least three of the districts within Göktepe.

The Italian team suggests on the basis of this signature that both the black and the white statuary-grade marbles from Göktepe were exported for sculptural production around the Mediterranean from the reign of Domitian until at least the fifth century A.D. Identification of the black marbles used in sculptures from Hadrian's Villa, including the Centaurs signed by Aristeas and Papias of Aphrodisias, represents the earliest known link between this stone and Aphrodisias. The authors also suggest that the white marble of the so-called Esquiline Group now in Copenhagen, also signed by Aphrodisian sculptors, was imported from Göktepe, arguing that their results trump those of an earlier study that assigned the marble to Carrara on the basis of isotopic analysis alone;[196] weak EPR intensities are more consistent with Göktepe marbles than Carrara marble.

Marble from Göktepe also seems to have been available at Aphrodisias from the second century A.D. onward, although in limited contexts. Black spiral-fluted columns

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[196] K. Matthews and S. Walker, "Report on the Stable Isotope Analysis of the Marble of the Esquiline Group of Sculptures at the Ny Carlsberg Glyptotek, Copenhagen," in C. Roueché and K. Erim (eds.), Aphrodisias Papers. Journal of Roman Archaeology Supplementary Series 1 (Ann Arbor 1990) 147–51; D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 338 and Table 5.

from Göktepe decorated the stage of the second century A.D. Bouleuterion.[197] Göktepe marble was also used at Aphrodisias for specific categories of Late Roman sculpture—small, decorative statuettes and portraits of emperors, governors, and priests. The marble of three late Roman statuettes, of Europa and the Bull, Cupid, and Aphrodite, has also been associated with Göktepe.[198] In addition, Göktepe has been claimed as the source of the marble used for a fourth-century statue of Valentian/Arcadius, a bust of a Sophist, and a bearded and balding male portrait head.[199]

It is important to note that other sources of black marble were available in the territory of Aphrodisias in the region around the village of Kırköy, 14 km southwest of Aphrodisias. Currently the company Uğur Mermer extracts a dark gray or black fossilliferous marble there. Our isotopic results show that the black marble bears the same signature as that from Göktepe, but it does not have the distinctive yellow calcitic cross-shaped inclusions. While careful investigation of the area suggests that the Kırköy Quarry was not worked in antiquity, the availability of black marble in this marble-rich

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[197] The isotopic signature of the Bouleuterion columns falls within the normal oxygen and carbon signatures for both Aphrodisian and Göktepe marble. According to the initial reconstruction of L. Bier, "The Bouleuterion," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008) 153–54, there is a maximum of eight spiral-fluted black columns on the lower level and six spiral-fluted columns on the upper level. A number of fragments of these columns lie in a block field in the North Agora.

[198] The sculptures were skillfully designed to take advantage of the black and white colors in the marble; the bodies of Europa, Cupid, and Aphrodite were white, while Europa's bull, Cupid's wing, and Aphrodite's drapery were all executed in black marble. J. Van Voorhis, "Black-and-White Sculpture from the Sculptor's Workshop at Aphrodisias," Annual Meeting of the Archaeological Institute of America (New York 1996); D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 330–36, and Table 3.

[199] D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 336–39, and Table 4. For a Valentinian/Arcadius and a bearded male head, see R. Smith, "Late Antique Portraits in a Public Context: Honorific Statuary at Aphrodisias in Caria, A.D. 300–600," Journal of Roman Studies 89 (1999) 162, and 182–88, respectively. For a Sophist bust, see R. Smith, "Late Roman Philosopher Portraits from Aphrodisias," Journal of Roman Studies 80 (1990) 148–50.

region and the recent discovery of the Göktepe source serve as a reminder that the likelihood of other, undiscovered ancient quarries outside the investigated survey boundaries is high.

It is not likely, however, that Aphrodisias had a direct hand in the exploitation and export of marble from Göktepe. The quarries lay well outside the territory of the city, and as we see above, export does not seem to have been a feature of Aphrodisias's local quarries. The scale of exploitation and quarry organization at Göktepe is also different from that of the regional quarries near Aphrodisias. The largest quarry at Göktepe is subterranean, and about 25 prefabricated blocks, one of which has been roughed out in the shape of a statue, have been abandoned in the Göktepe quarries.[200] In addition, Greek and Latin tracking marks inscribed on the blocks, circular impressions for the fitting of lead imperial seals, and on-site housing for laborers are all hallmarks of imperial oversight.[201] This evidence indicates that Göktepe was in fact an imperially owned, specialty quarry. Yet the connections between Göktepe marble and Aphrodisian sculptors suggest that local ties to this quarry may have been instrumental in launching the careers of Aphrodisians abroad, showing how Aphrodisian sculptors, trained in a local tradition of fine carving, were chosen to carry out the imperial commissions, which

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[200] A roughed-out statue of a Hanging Marsyas is on display in the Afyon Museum. A statue of a Dacian prisoner intended for the Forum of Trajan was abandoned in the quarries because of flaws in the marble; M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89 (1985).

[201] See M. Bruno, "Considerazioni sulle Cave, sui Metodi di Estrazione, di Lavorazione e sui Trasporti," in M. De Nuccio and L. Ungaro (eds.), I Marmi Colorati della Roma Imperiale (Venice 2002) 179–93; E. Spagnoli, "Bolli in piombo per il marmo," I Marmi Colorati 492–96; D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 344.

in turn brought recognition to Aphrodisias in general as a center for high-quality sculpture production.

QUARRYING IN LATE ANTIQUITY

The frenetic building activity that characterized the earlier phases of the history of Aphrodisias slowed dramatically in the mid-third century.[202] From the third to the fourth century A.D., several impressive new building projects were undertaken, but they did not rely to the same degree on newly quarried stone as earlier buildings.[203] Spolia from dismantled monuments were used to create new public buildings and monuments, and old buildings were reconfigured to serve the changing needs of the Late Antique city. The largest of these projects, the 3.5 km long City Wall, drew from spoliated monuments and tombs for its outer facing, while the inner face of the wall was built of petit appareil blocks that were probably newly quarried for this purpose.[204] On a less resource-intensive scale, the Temple of Aphrodite was transformed into a Cathedral, and the

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[202] On the city in Late Antiquity, see C. Ratté, "New Research on the Urban Development of Aphrodisias in Late Antiquity," in D. Parrish (ed.), Urbanism of Western Asia Minor. Journal of Roman Archaeology Supplementary Series 45 (Portsmouth, RI 2001) 116-47.

[203] After sustaining damage, the Tetrapylon, the gateway to the Temple of Aphrodite, was reconstructed with at least one monolithic column from a different building. Reuse is indicated by the mix of white spiral-fluted monolithic columns; G. Paul, "Die Anastylose des Tetrapylons in Aphrodisias," in R. Smith and C. Roueché (eds.), Aphrodisias Papers 3. Journal of Roman Archaeology Supplementary Series 20 (Ann Arbor 1996) 201–13; C. Ratté, New Research on the Urban Development of Aphrodisias in Late Antiquity," in D. Parrish (ed.), Urbanism of Western Asia Minor. Journal of Roman Archaeology Supplementary Series 45 (Portsmouth, RI 2001) 116-47.
127.

[204] P. De Staebler, "The City Wall and the Making of a Late Antique Provincial Capital," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4. Journal of Roman Archaeology Supplementary Series 70 (Portsmouth, RI 2008) 284–318.

eastern end of the Stadium was adapted to serve as an arena, each in part by quarrying the original building for materials.[205]

This practice of using spolia was widespread in other cities in Asia Minor and across the empire. The resulting disruption to cityscapes from the systematic dismantling of public monuments is well attested in literary sources.[206] On several different occasions, the emperor interceded on behalf of provincial cities to prohibit the transfer of looted monuments from one city to another.[207] Through the fourth century, the central government attempted to stimulate new quarrying by addressing the shortage of materials and quarrymen with laws that encouraged private individuals to open new quarries and to continue to work old ones.[208]

At Aphrodisias, evidence from the city and within the quarries points to an active, albeit diminished, industry. In the city, Late Antique public buildings, churches, and monumental private townhouses displayed elements such as capitals and pediments that were presumably carved from newly quarried stone into the late third and fourth centuries

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[205] On the conversion of the Temple of Aphrodite into a church, see R. Cormack, "The Temple as the Cathedral," in C. Roueché and K. Erim (eds.), Aphrodisias Papers Journal of Roman Archaeology Supplementary Series 1 (Ann Arbor 1990) 75–88; and L. Hebert, The Temple-Church at Aphrodisias, Ph.D. dissertation (New York 2000). For the stadium, see R. Smith and C. Ratté, "Archaeological Research at Aphrodisias in Caria, 1997 and 1998," American Journal of Archaeology 104 (2000) 227.

[206] Code of Theodosianus 4.1; Majorian (A.D. 457–461) brought the issue to Rome's city government: "Under the pretense that the materials are needed for public works, the beautiful structures of ancient monuments are being made to disintegrate, and great things are being pulled down in order that something small be required."

[207] Code of Justinian 15.1.1; Justinian (A.D. 529-534) tried to preserve urban infrastructure by outlawing the stripping of public monuments: "No one should think that cities may be deprived of their own ornaments, since indeed it was not considered right by the ancients that a city should lose its glorious adornments, and that they should be transferred to the buildings of another city"; and Code of Justinian 15.1.14: "We further proscribe the boldness of provincial magistrates who, to the destruction of obscure towns, pretend that they are adorning metropolitan or other most splendid cities, and for this reason seek statues, marbles, columns in order to transfer them. It shall not be permitted to commit such deeds with impunity after the enactment of our law, especially since we have ordered that no new structures should be begun before the old ones are restored. And if indeed any work should be begun, other cities must be spared."

[208] Code of Theodosianus 10.19.1, 10.19.3, 10.19.8, and 10.19.32.

A.D.[209] New church construction in the countryside would also have created demand for freshly quarried stone, but even many of these incorporated reused blocks into their infrastructure.[210] Several local quarries would have stopped production in this period, such as the quarry at Yazır. The mottled blue and white monolithic columns incorporated into the later phases of the atrium of the Cathedral, the Triconch House, and the Atrium House were likely reused from earlier monuments. There is direct evidence, however, that at least some quarries remained active, such as the City Quarries, where stonecutters carved several crosses and a Christian prayer dated to the fifth century onto the face of the largest quarry.[211] The Göktepe Quarries also appear to have remained in use.

Demand for portrait statuary continued in this period.[212] A sculptor's workshop in a stoa behind the Bouleuterion replete with tools, practice pieces, and unfinished statuary attests the continued production of sculpture into the mid-fourth and fifth centuries A.D.[213] New styles of dress made it difficult to reuse earlier statues and may account in part for the sculpture industry's ongoing need for fresh material. In some

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[209] For a group of Late Roman figured pilaster capitals from the late third to early fourth century A.D. from the apsidal hall of the North Temenos House, see S. Dillon, "Figured Pilaster Capitals from Aphrodisias," American Journal of Archaeology 101 (1997) 731–69; for contemporary pediments in the Atrium House, see R. Smith, "Late Roman Philosopher Portraits from Aphrodisias," Journal of Roman Studies 80 (1990) 129–30.

[210] Ö. Dalgiç, "Early Christian and Byzantine Churches," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming). Late Antique and Byzantine-period churches were constructed immediately outside the city walls as well as in the hinterland.

[211] A. Chaniotis, preliminary report (2001), I01.30.

[212] Late Antique sculptural production is described in detail in R. Smith, "Late Antique Portraits in a Public Context: Honorific Statuary at Aphrodisias in Caria, A.D. 300–600," Journal of Roman Studies 89 (1999) 155–89. For a discussion on the end of the civic portrait tradition, see R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 74; for portrait statues made into the third to fifth century A.D., see catalogue entries 121, 122, 136, 142, 173, 190, and 220.

[213] J. Van Voorhis, "Apprentices' Pieces and the Training of Sculptors at Aphrodisias," Journal of Roman Archaeology 11 (1998) 175–92.

cases, a single element of a statue—a head, body, or base—was reused and a newly carved piece inserted where it was needed; bases were, without exception, reused.[214]

Epigraphic evidence helps to illuminate underlying attitudes toward new materials and spoliation. Verse honors for Anthemius, dated to the fifth or sixth century, say:

> The array (of the Carians) set up your statue, prefect, giving a small reward for your benefactions; for, Anthemius, saving peoples and cities, you also rescued the order of the Carians, which was being destroyed, to whom (the Carian) Beronicianus, occupying the seat of governor, gave instructions to make a marble statue.

The dedicatory inscription of another portrait statue says:

> To Good Fortune. You have made many presents to your country, Rhodopaeus, so many that they are not easy to say or to count; and the city has presented you with great honors, father, having set up your image in marble so that time may not obscure your image, you who are loved by many, overshadowing it with forgetfulness.[215]

Freshly cut marble seems to have been a prized item and to warrant mention when a civic aristocrat was honored with a marble image, which would not have been the case in earlier periods.[216] In Italy, at Campanian Abella, a benefactor boasted in A.D. 333 that he paved the streets with stone "cut from the mountains, and not with stone removed from ruined monuments."[217]

Local sculpture workshops continued to flourish well into Late Antiquity, and the scale and quality of the sculpture found at Aphrodisias exceed that of other urban sites across the Mediterranean; partly for this reason, Aphrodisias has become central to

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[214] R. Smith, "Late Antique Portraits in a Public Context: Honorific Statuary at Aphrodisias in Caria, A.D. 300–600," Journal of Roman Studies 89 (1999) 161–62, cites the examples of a statue of Julian-Theodisian, whose togate body was recycled and a newly carved head set onto a reused body for the governor Alexander.
[215] C. Roueché, Aphrodisias in Late Antiquity, http://insaph.kcl.ac.uk/ala2004, nos. 36 and 85.
[216] R. Smith, "Late Antique Portraits in a Public Context: Honorific Statuary at Aphrodisias in Caria, A.D. 300–600," Journal of Roman Studies 89 (1999) 167.
[217] CIL X, 1199.

discussions concerning both mythological and portrait statuary in Late Antiquity. N. Hannestad and M. Bergmann both view groups of life-sized fourth- to fifth-century A.D. statues from the villa at Chiragan in Gaul as Aphrodisian products.[218] The statues include a dozen reliefs of the Labors of Hercules, 13 tondi of gods, and a version of the "Old Fisherman." According to Hannestad and Bergmann, the sculptural genres, marble types, and certain stylistic characteristics, such as neck struts, drapery details, and tondo shapes, link these statues to Aphrodisias, from where they argue the statues were directly imported. L. Stirling, however, argues that these statues were probably produced in Constantinople, where commissions for new imperial building projects drew together sculptors from a number of local centers in Asia Minor, resulting in an amalgam of local technical and stylistic characteristics also shared by sculptors working at Aphrodisias.[219] Conclusions about the origins of the marble used in the sculptures from Chiragan must remain speculative and await the results of future scientific analysis. It is hoped that improved knowledge about the quarries of Aphrodisias and the nature of the local marble industry will shed light on these intersecting debates about urban development, sculptural production, workshop organization, and the origins of raw materials.

CONCLUSION

Interdisciplinary geological and archaeological investigations of the newly discovered regional marble quarries, the results of geochemical tests, and examination of

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[218] N. Hannestad, Tradition in Late-Antique Sculpture: Conservation, Modernization, Production (Aarhus 1994) 127–43; M. Bergmann, Chiragan, Aphrodisias, Konstantinopel (Rome 1999) 26–43, 55.
[219] L. Stirling, The Learned Collector (Ann Arbor 2005) 91–137.

the archaeological and epigraphic record contribute new information about marble in the social and economic life of Aphrodisias. Civic adornment was expensive, and building materials were not free. Cities such as Aphrodisias were willing to invest considerable resources in the acquisition of high-quality and visually distinctive stone. Aphrodisias was well supplied with local marbles, but for the most part, the regional quarries seem to have served local needs, and it is unlikely that the export of this abundant natural resource ever played a significant role in the local economy. The strong internal demand for marble generated wealth and prestige for the local landowners, contractors, and craftsmen working in the marble industry, but because profit was not based on an external trade market, only the entrepreneurs directly involved, and not the the city as a whole, benefited from marble as a source of income. Marble quarrying remained an economically viable business in as much as it did not run a deficit, and this remained true throughout much of Aphrodisias' history. While it is impossible to know how much wealth was generated for various individuals, it was likely less than that derived from the locally produced and locally consumed agricultural commodities in the city's fertile farmland. The city's self-sustaining local economy made it possible for Aphrodisias to take advantage of its local marble resources and to compete with other cities of the region in the culturally important business of civic beautification.

CATALOGUE

1. Yazır Quarry (A082) (Fig. 3.33)

Location: 1 km northeast of the modern village of Yazır, 100 m below the Hellenistic citadel on the northwestern side of Gâvur Pazarı hill.[220] Accessible by unpaved road, 1 km south of Yazır, 11 km from Aphrodisias. Elevation ca. 850 masl.

Number and dimensions of quarries: Single medium-sized quarry.

Quarry 1: H: 33 m, W: 38 m, D: 21 m; the largest individual quarry outside of the City Quarries and it preserves the highest face of all regional quarries.

Capacity: ca. 6,750 m^3; sixth largest quarry complex.

Geological age, grain size, and color: Late Paleozoic. The white mottled areas range from medium to coarse grain, and the blue, fine to medium. Weathered surfaces of the quarry face partially covered in lichens. Mottled blue-gray and white color, ranging from horizontal lineations to swirling foliations. Strongly resembles the blue and white marble quarried at Dokimeion.[221]

Modern quarrying: Winding road that runs by the quarry now provides access to the Demirağlar Quarries at the crest of the ridge, currently largest operating quarry in the survey region. Obscured by a steep hillside and towering pine trees, quarry has escaped notice of prospectors, who have drilled test cores on hill and quarry *giallo anticato*, rosa silver, leopard white, and *verde rosa* several hundred m away.

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[220] The building stone used for the citadel is mainly schist and some marble, and was extracted from separate quarries at the top of the hill, closer to the citadel structure.

[221] M. Waelkens, "Carrières de Marble en Phrygie," Bulletin des Musées Royaux d'Art et d'Histoire, Bruxelles (1982) 33–55.

Joints and quality of marble: Few natural cracks on the north face, with considerable distance between the natural joints in stone, estimated ca. 15 m high and 5 m wide. On the west face, a number of horizontal joints run parallel to ground surface. Joint spacing on the west face ranges from 0.7 to 0.45 m high and 3 to 1 m wide. Quality of marble is very high.

Quarry organization and evidence for extraction: Quarry opens to the west. Cut made into the hill is V-shaped in plan. Long, continuous pickmarks cover entire surface of north quarry face. On lower portions of west face, traces of heavy pickmarks and several wedge holes are visible. Pickmarks run both vertically and horizontally. Debris was apparently removed from the back of the quarry and thrown down the hillside.

Blocks: Block abandoned in mouth of quarry (H: 0.6 m, W: 0.6 m, D: 1.6 m). Small rectangular block and column, both broken, lie in mountain stream below.

Transportation: The major slipway leads down a scree-covered hill to perennial stream ca. 50 m below. The stream runs into the upper part of Yazır, where it has been tapped as the village's main water source. Since the Morsynus river is deeply incised in the western portion of the valley, the stone would presumably have been carried along the south side of the valley until the more level areas of the river plain were reached; almost the entire route could have been downhill. Distance to Aphrodisias, including transportation route, is ca. 15–19 km (see Fig. 3.24).

General Discussion

The marble from Yazır is visually distinctive, and isotopic analysis shows that it has a unique chemical signature. Samples taken at Aphrodisias from architectural elements

carved from a visually similar marble have the same isotopic signature and include the monolithic columns in the Tetrapylon, the Theater Baths, the Tetrastoön, Gaudin's Fountain, Gaudin's Gymnasium, as well as the pedestals and monolithic columns in the Hadrianic Baths. On this evidence, we suggest that those elements were from the Yazır Quarry. Monolithic columns from the Tetrakionion, the Triconch House, the Atrium House, the Temenos of the Temple of Aphrodite, and the forecourt of the Cathedral all display similar colors and properties but were not sampled for analysis. The volume of the relevant architectural members in all these buildings is less than the total production capacity of the quarry.

The heights of these columns range from 2.41 m to 6.5 m: Tetrakionion, 6.5 m; Tetrapylon, 5.6 m; Hadrianic Baths, 5.4 m (round) and 5.0 m (double engaged); atrium of the Cathedral, 4.78 m (large) and 2.47 m (small); Gaudin's Gymnasium, 4.7 m; Theater Baths, 4.1 m; Tetrastoön, 4.1 m; Atrium House, 4.0 m (unfluted in forecourt), 3.5 m (fluted outside tetrastyle court), and 2.41 (double engaged); Gaudin's Fountain, 3.68 m; and Triconch House, 2.6 m. Buildings with Yazır marble elements clearly in a primary-use context date from the mid-second to the early fourth century A.D.; buildings with columns in secondary use date from the mid-fourth to the sixth century A.D. In all likelihood, the quarry was opened in the early to mid-second century A.D. for the purpose of obtaining large-scale, colored architectural elements; the quarry also provided a number of buildings with marble revetment.

2. Ören Quarries (A116) (Fig. 3.34)

Location: West of Ören village, scattered on the west slope of Gâvuröreni Tepe (Hill of the Infidel Ruins) and on the southern slope of Göz Tepe, 7.5 km from Aphrodisias. Elevation 960 masl. Quarries lie in same marble-rich zone as quarries at Hançam (7 km west), Kızıl Cağıl (2.5 km northwest), Nargedik (7 km southwest), and Çamarası (4.5 km due west).

Number and dimensions of quarries: Four main groups of quarries on two hills. Three groups on Gâvuröreni Tepe cover ca. 0.5 km^2; single group on Göz Tepe (0.75 km to west) covers 0.25 km^2. On Gâvuröreni Tepe, at least 20 small to medium-sized quarries and additional small pits are configured in a straight line below one another, connected by slipway paths. Modern quarrying is confined to the crest of the hill, with limited additional prospection and drilling at the base. Extensive modern quarrying on Göz Tepe. The three medium-sized and 17 small quarries are bowl-shaped quarries with discernible faces and sides or simple pits.

Gâvuröreni Quarries, base of hill:

Quarry 1: H: 1.5 m, W: 10 m, D: 6.0 m, Vol: 90 m^3

Quarry 2: H: 1.0 m, W: 8.0 m, D: 3.0 m, Vol: 24 m^3

Quarry 3: H: 2.3 m, W: 15 m, D: 13 m, Vol: 449 m^3

Quarry 4: H: 4.0 m, W: 45.3 m, D: 17 m, Vol: 3080 m^3

Quarry 5: H: 1.4 m, W: 11 m, D: 6.0 m, Vol: 92 m^3

Quarry 6: H: 2.0 m, W: 15 m, D: 9.0 m, Vol: 270 m^3

Quarry 7: H: 4.3 m, W: 16 m, D: 13 m, Vol: 894 m^3

Quarry 8: H: 2.6 m, W: 5.0 m, D: 4.2 m, Vol: 55 m^3

Quarry 9: H: 1.0 m, W: 3.0 m, D: 9.0 m, Vol: 27 m^3

Gâvuröreni Quarries, middle of hill:

Quarry 10: H: 7.9 m, W: 40 m, D: 20 m, Vol: 6,320 m^3

Gâvuröreni Quarries, top of hill:

Quarry 11: indeterminate

Quarry 12: H: 2.9 m, W: 14 m, D: 11 m, Vol: 447 m^3

Quarry 13: H: 4.3 m, W: 12 m, D: 10 m, Vol: 516 m^3

Quarry 14: H: 9.9 m, W: 43 m, D: 12 m, Vol: 5,108 m^3

Quarry 15: H: 3.0 m, W: 4.0 m, D: 9.0 m, Vol: 108 m^3

Quarry 16: H: 2.0 m, W: 30 m, D: 14 m, Vol: 840 m^3

Göz Tepe Quarries:

Quarries 17-20: Intdeterminate.

Capacity: ca. 18,500 m^3; second largest quarry complex.

Geological age, grain size, and color: Mesozoic. Medium to coarse grained. Primarily white marble but with varying intervals of gray, mottling, a translucent bluish white and tan breccia.

Modern quarrying: Extensive modern intrusion. In June 2008, Bes Mer from Izmir was active on the southeast slope of Gâvuröreni Tepe, and abandoned worker's lodging is on top of the hill. According to local informants from Ören, marble companies had destroyed several ancient structures, including a tower and several vaulted chambers. Modern wastage blocks scar the landscape and are visible from any vantage point in the western Morsynus river valley.

Joints and quality of marble: Joint spacing is more generous here than in the other Southern Quarries, which explains why this area was worked more heavily. Area

between joints varies in height from 3.0 m to 6.0 m and in width from 2.5 m to 4.0 m. Marble quality is high enough to have yielded some of the longest white blocks used in the city.

Quarry organization and evidence for extraction: Ören Quarries took advantage of natural contours to obtain a greater supply of large blocks and to facilitate their transport out of the quarry.

Of the five pit quarries at top of Gâvuröreni Tepe (Quarries 11–16), some grew to be quite wide; Quarry 14, the largest, measures 9.9 m high, 43 m wide, and 12 m deep. In Quarry 11, a handful of blocks with ancient pickmarks line the uppermost, lateral, and bottom portions of the perimeter; it is impossible to determine the ancient extent though (modern capacity ca. 300,000 m^3) because of extensive intrusion from modern quarrying.

Quarry 10 lies below and south of the upper quarries and is medium sized. Modern quarrying has destroyed the lower levels, while the ancient quarry face and the original floor are preserved in the upper portion. On the upper face, joints are spaced widely enough for extraction of large blocks; after exposing a joint 4.0 m wide, quarrymen dug down 6.5 m, working in steps as they removed a succession of blocks from the thick marble beds. Quarry floor preserves four excavation trenches with traces of pickmarks and wedge holes.

A third group of quarries lies 175 m below and south of Quarry 10. This area comprises nine different ancient quarries (Quarries 1–9), all connected by visible slipways. At the end of one slipway, a graffito of a bird was scrawled on a block that was once part of an ancient quarry face but has since been removed from its original location by modern quarriers.

Quarry 4 is a medium-sized, bowl-shaped quarry. Two separating channels, 2.5 m long and 1.25 m wide, are partially exposed on the floor.

Quarry 6 preserves a shallow, stepped face and wide working floor, filled with spoil. A series of nine wedge holes, spaced 0.15 m apart, runs along base of a separating channel, along natural fractures in the marble; the intent was to extract two blocks, each 1.0 m long.

Quarry 7 is bilevel with numerous worked floors. The scree that typically accumulates over time and obscures the original extent of a quarry has been removed by modern quarriers. Ancient quarry floors, or bottoms of separating trenches, are well preserved. The upper level was exploited first. After a nearly vertical north–south and east–west joint was exposed at floor level, quarriers followed it downward to what became the lower level. The pattern of trenches on the floor shows that quarrymen extracted standardized blocks, in three different widths—0.62 m, 0.90 m, and 1.50 m—and in varying lengths over 1.0 m. Separating trenches were placed in alternating directions, parallel and perpendicular to natural north–south and east–west joints. In one well-preserved section, separating trenches 0.25 m wide are on either side of a block 0.66 m wide and 3.50 m long; a regular line of tool fine-point chisel marks, 1 cm apart, is seen on three sides of the trench, indicating the intended bottom of the block. These marks scored the bottom of a block so that when pressure was applied, the block would break away along an even line.

A slipway leading out of Quarry 9 ends at a level area surrounded by three low stone walls, which was possibly a staging ground for cutting blocks or area of shelter for workmen.

Four small quarries are on Göz Tepe, with traces of ancient pickmarks preserved in each. A single slipway, clearly visible in satellite images, connects the Göz Tepe and Gâvuröreni Tepe quarries at the foot of the hills.

Blocks: Small worked block lies among abandoned modern blocks in Göz Tepe quarry.

General Discussion

The extraction techniques and organization of the Ören Quarries are strikingly similar to those of the City Quarries, although these never reached that scale, probably because of the difficulty of transporting stone across the valley.

3. Hançam Quarries (B009) (Fig. 3.35)

Location: On west side of the road southeast of Karacasu, 1 km before turnoff to Bingeç, 10 km from Aphrodisias. Elevation 850 masl. Situated on two separate ridges between Hançam Musluğu and Hangediği among pine-forested hills. Quarries are in the same marble-rich zone as those at Ören, Çamarası, Kizil Cağıl, and Nargedik.

Number and dimensions of quarries: Quarry complex comprises three medium-sized and two small quarries spread over 0.06 km^2.

Quarry 1: H: 5 m, W: 13 m, D: 54 m, 3,510 m^3

Quarry 2: H: 5 m, W: 22 m, D: 52 m, 5,720 m^3

Quarry 3: H: 4 m, W: 18 m, D: 45 m, 3,240 m^3

Quarry 4: H: 0.5 m, W: 6 m, D: 12 m, 36 m^3

Quarry 5: H: 2.5 m, W: 14 m, D: 27 m, 945 m^3

Capacity: ca. 13,500 m^3; third largest quarry complex

Geological age, grain size, and color: Mesozoic. White marble is medium to coarse grained with limited sections of a dark gray and white mottled marble. Lenses of fine-grained blue-gray marble, visible at ground surface between Quarries 2 and 3 and on lateral face of Quarry 3. Roman quarries targeted white marble veins and avoided blue gray lenses.

Modern quarrying: Extensive waste from modern working in Quarries 1–4. Modern quarrying atop hill has completely destroyed possible evidence of ancient activity. Small modern house for workers located at bottom of quarries.

Joints and quality of marble: Joint spacing ranges from 1 m to 2 m long and 0.8–4.5 m wide, sizes well suited to most architectural needs.

Quarry organization and evidence for extraction: Complex in two districts. Quarries 1–3 are situated next to one another in south to north direction with Quarry 1 the highest. A well-preserved slipway leads from the base of Quarry 3 to the second district, Quarries 4–5 located lower on the northern ridge. Quarry 4 is a small pit below slipway, which terminates at Quarry 5. Quarries 1–3 and 5 are long and narrow with rectangular faces. Spoil and modern blocks are deposited on the floors. The faces of Quarries 1 and 2 are well preserved and continue below the spoil level, making it difficult to ascertain original depth. Quarries 1–3 preserve the most separating channels of all regional quarries and are placed at angles that follow the natural joints. On the face of Quarry 2 (at a 45˚ angle), erratic pickmarks, surrounding by separating channels, suggest that quarrying was abandoned.

Blocks: A broken block (H: 0.4, W: 0.2, D: 0.1 m) dressed with a point chisel is abandoned in Quarry 3. Blocks could have been worked either inside the quarry or at another staging ground.

General Discussion

The modern quarriers have produced so much waste that it is questionable how much marble they were able to extract, while the ancient quarrymen were apparently more successful. The organization of the Hançam Quarries resembles that of Ören and the City Quarries. Yet, because the marble here is more closely jointed than the marble at Ören, the Hançam Quarries did not reach a similar scale of exploitation.

The Roman prospectors carefully determined the quality and color of marble in a given area before opening a new quarry. The fine-grained blue marble at the surface, in the area between Quarries 2 and 3, was consciously skipped over in favor of the coarser grained white marble excavated in the open quarries. Quarry 3 displays a clear preference for the white coarse-grain marble, the predominant type of marble targeted in this area. On the south side, work was halted when the fine-grained blue marble was reached and on the north face when the white marble was depleted and a breccia exposed. The quarry may have been abandoned because the supply of easily accessible white marble had been exhausted.

4. Çamarası Quarries (A053) (Fig. 3.36)

Location: 2 km south of village of Çamarası, between Keçikırılân and Düğün Yurdu, 9 km southwest of Aphrodisias. Elevation ca. 825 masl. Modern road to ancient quarries

is used for access to active emery mine at the top of the hill and in the recent past to a now-defunct marble quarry at the site of ancient quarries. Two of the largest quarries in the series are visible along the western side of the road. Region is now an unpopulated and desolate zone overgrown with scrub oak. Quarries situated in the same marble-rich zone as the Hançam, Kizil Cağıl, Ören, and Nargedik quarries.

Number and dimensions of quarries: Two medium-sized and five small quarries are scattered over an area of 1.5 m^2. Scrub oak may obscure other small pits that have not been identified.

Quarry 1: H: 6.0 m, W: 50 m, D: 12 m, Vol: 3,600 m^3

Quarry 2: H: 5.0 m, W: 33 m, D: 18.6 m, Vol: 3,069 m^3

Quarry 3: H: 1.2 m, W: 15 m, D: 10.6 m, Vol: 191 m^3

Quarry 4: indeterminate

Quarry 5: H: 6.1 m, W: 8.5 m, D: 4.2 m, Vol: 207 m^3

Quarry 6: H: 9.1 m, W: 12.1 m, D: 5.65 m, Vol: 622 m^3

Quarry 7: H: 6.9 m, W: 19 m, D: 11 m, Vol: 1,442 m^3

Capacity: ca. 9,150 m^3; fourth largest quarry complex

Geological age, grain size, and color: Mesozoic. Medium to coarse grained. White, white and gray mottled, and brecciated marble.

Modern quarrying*:* Quarry 1 moderately disturbed, used by the active emery quarry as a dumping ground; the others are undisturbed. Large quarry on the hillside between ancient quarries is modern.

Joints and quality of marble: Joint spacing 1.40–2.75 m long and 1.70–3.80 m wide. Surface displays moderate fracturing, but marble quality improves at deeper levels. Medium to high quality.

Quarry organization and evidence for extraction: Quarries lie on a high plateau in separate upper, middle, and lower districts. In the lower district, Quarries 1 and 2 are large, oval pit quarries and preserve traces of pick- and point-chisel marks, separating channels, and wedge holes along the lateral sides. In the middle, 50 m north of Quarry 1, are Quarries 3 and 4, both small pit quarries. Quarry 3 is a square pit quarry, and pickmarks on the west face cover an area 1.40 m high, 3.80 m wide, and 1.20 m deep, the approximate dimensions of an average-sized sarcophagus. Quarries 5 and 6 are also small pits and line a road leading to the modern emery quarry.

Quarry 7, one of the best preserved of all the quarries on the south side of the valley, is in the upper district, 0.5 km south of the main quarry area on a ridge above the plateau offering a dramatic view of the south part of the Morsynus river valley. Two parallel slipways lead 200 m from the quarry to the road. A rectangular face is dug 11 m into the hillside, and a series of five steps formed by joints in marble juts outward from the quarry face. A separating channel on the top step shows that the width of the block to be extracted was 0.50 m.

Blocks: A roughed-out column is abandoned on the perimeter of Quarry 1. A cracked threshold block (H: 0.76 m, W: 1.75 m, and D: 0.53 m) and seat block (H: 0.70 m, W: 0.75 m, and D: 0.25 m) are abandoned in the spoil heap near Quarry 2. A sarcophagus chest (H: 1.05 m, W: 1.20 m, D: 2.75 m) is abandoned in Quarry 5; the cracked chest has

been only partially hollowed, and 10 m to the south lies its corresponding lid (H: 0.40 m, W: 1.25 m, D: 2.30 m).

General Discussion

The quarries conform to the same model found in the other regional quarries in which prospection was carried out over a large area once marble resources were discovered. The fractured quality of the subsurface marble presented the most immediate constraints to the extraction of marble from Çamarası. Quarry 7 is one of the best preserved of the white-marble quarries and clearly illustrates the most commonly used extraction techniques. The practice of exploiting natural joints explains why many exposed faces in the territorial quarries appear to be unworked. Ancient quarrymen were adept at finding these joints after the initial removal of the surface strata of eroded marble and topsoil. When the underlying marble thus revealed was inhomogeneous and fractured, the quarrymen had to be flexible in determining the direction in which to quarry. The spacing of the joints naturally determined the size of resultant blocks.

The sarcophagus and lid are important pieces of evidence for the nature of work that occurred at Çamarası, providing a direct link between the exploitation of regional marble resources and marble working at Aphrodisias. The quarries at Kızıl Cağıl, Hançam, and Ören must have supplied the city with similar kinds of products. In general, prefabricated blocks were not left in the Aphrodisias quarries. While it is conceivable that material was hauled out of the quarries for use in later periods, even isolated quarries, such as Çamarası Quarry 7, do not have blocks strewn about the quarry site. This evidence suggests that the stone was extracted for specific commissions, and that objects

were roughed out in the quarries, delivered to and finished within the architectural and sculptural workshops within the city.

5. Kızıl Cağıl Quarries (B082) (Fig. 3.37)

Location: Along the eastern side of the road running due south from Aphrodisias, on the far side of the river along the first ridge above the valley floor, 5 km south of Aphrodisias. Elevation 745 masl. Modern quarry is plainly visible from Aphrodisias, since modern quarrying has scarred the hillside. Quarries are in the same marble-rich zone as those at Hançam, Çamarası, Ören, and Nargedik.

Number and dimensions of quarries: Six pit quarries, four small and two medium sized (Quarries 1–2), both of which have been expanded by modern working.

Quarry 1: H: 2.5 m, W: 41 m, D: 34 m, Vol: 3,485 m^3

Quarry 2: H: 3.0 m, W: 44 m, D: 33 m, Vol: 4,356 m^3

Quarry 3: H: 1.5 m, W: 5.0 m, D: 10.8 m, Vol: 81 m^3

Quarry 4–6: indeterminate, but quite small

Capacity: ca. 7,950 m^3; fifth largest quarry complex

Geological age, grain size, and color: Mesozoic. Medium to coarse grained. White with thin gray intervals. Small zones of fine-grained tan marble, breccias filled with fractures of red calcite cements, clasts of white and gray marbles, and metabauxite clasts.

Modern quarrying: Extensive throughout.

Joints and quality of marble: Extensively fractured at surface; relatively poor at top, but quality improves at lower levels. Largest joint spacing is 2.10 m (measured on back face of Quarry 2).

Quarry organization and evidence for extraction: Faces of Quarries 1 and 2 are weathered in manner of other ancient quarries and preserve no evidence of ancient working, which is limited to one side of a large modern waste block bearing ancient pick- and point-chisel marks. Roman quarriers followed a long natural northwest/southeast joint. Quarries 4–6 may have yielded no more than five or six medium-sized blocks each, as numerous joints are present.

Main slipway leads from Quarry 2 to the modern road, then continues to the southeast. From Quarry 2, a second slipway leads southward to Quarry 1 on the west side. A third slipway leads east from Quarry 1 past spoil heaps and Quarries 4–6. Blocks: A small column fragment and broken mortar are abandoned in spoil heaps of Quarry 3. A column and large mortar were found at an early modern farmstead near the quarry entrance.

General Discussion

This quarry also provides rare evidence for ancient emery mining. The walls of a pit (D: 4.0 m, W: 5.0 m) located east of Quarry 1 display clasts of unmetamorphosed white breccias and emery. Roman quarriers freed the emery by digging away the surrounding material. A modern emery mine near Çamarası may provide technological parallels for ancient practices. One group of workers (all women) remove the metabauxite clasts from the surrounding matrix with picks, as the other group (all men) splits the stone with sledgehammers. Two grades of metabauxite are mined at the site. The lower grade is sent to a local production shop 2 km south of the quarry where whetstones were manufactured. The higher quality material is shipped to İzmir and then to an

international market. The gathering and mining of emery in the Morsynus river valley have a long history, dating back to the Bronze Age, when the material was used for axes and adzes.[222] It must have been most extensively exploited in the Roman period, when emery would have been regularly used as an abrasive by Aphrodisian sculptors.

6. Nargedik Quarries (B046) (Fig. 3.38)

Location: At the edge of the plateau south of Aphrodisias, along the road east of Nargedik village on the foothill of Yarışalam Tepe. The water tank on Yarışalam Tepe serves as a landmark for the southwestern part of the Morsynus river valley; 11 km southwest of Aphrodisias. Elevation ca. 815 masl. Quarries lie in the same marble-rich zone as Ören, Hançam, Çamarası, and Kizil Cağıl.

Number and dimensions of quarries: Ten small pit quarries are spread over an area of 0.04 km^2. Even the largest are quite shallow; additional smaller pits are identifiable as hollows filled with scrub oak.

Quarry 1: H: 3.0 m, W: 30 m, D: 20 m, Vol: 900 m^3

Quarry 2: H: 4.0 m, W: 23 m, D: 11 m, Vol: 1,012 m^3

Quarry 3: H: 2.0 m, W: 27 m, D: 21 m, Vol: 1,134 m^3

Quarry 4: H: 1.5 m, W: 54 m, D: 36 m, Vol: 2,916 m^3

Quarry 5: H: 1.0 m, W: 1.6 m, D: 1.0 m, Vol: 1.6 m^3

Quarry 6: H: 1.0 m, W: 1.4 m, D: 1.3 m, Vol: 1.82 m^3

Capacity: ca. 6,000 m^3; seventh largest quarry complex

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[222] P. Getz-Preziosi, "Stone Figurines" in M. Joukowsky, Prehistoric Aphrodisias (Leuven 1988) 228–29.

Geological age, grain size, and color: Mesozoic. Medium to coarse grained. White and white with intervals of gray.

Modern quarrying: None.

Joints and quality of marble: Joint spacing ranges from 0.5 m to 1 m, and mainly small to medium-sized blocks were extracted. Recent excavation of a water channel running from the water tank atop the hill to the village has churned up superficial deposits of pure white marble. The relatively poor quality of the stone presumably inhibited more extensive quarrying.

Quarry organization and evidence for extraction: Evidence for ancient working is limited to three areas in Quarry 4, where pickmarks and several wedge holes are visible.

Blocks: None.

General Discussion

The numerous open-pit quarries do not exhibit the same organization as the larger quarry complexes at Ören, Hançam, Çamarası, and Kizil Cağıl, probably because the marble is of a lower quality. The small pit quarries at Nargedik were likely opened for the extraction of small blocks, such as petit appareil blocks, or perhaps for a single project in the immediate vicinity.

7. Baba Dağı Quarries (C084) (Fig. 3.39)

Location: In the saddle between Ak Baba Dağı and Kara Baba Dağı peaks on the southern slope of a precipitous ridge between Ayakliçeşme Tepe and Akçasöğüt Tepe; 17 km from Aphrodisias. Elevation 2,010 masl. Only accessible by foot; the easiest

approach is by a forestry road that passes by the small villages of Koyuncular and Yağlılar and continues through pine forests before it terminates at the foot of Karacaören Tepe. The climb to the quarries is a steep ascent for 3.5 km through the deeply cut Dangaz Dere. Alternatively, it is also possible to walk from the base of the summit of Ak Baba Dağı across the long ridge toward Kara Baba Dağı for about two hours before dropping down to the quarries. The site offers a dramatic view over the western pass at Yaşiler and beyond to the open plain of Tabae. This mountaintop quarry is identifiable by the large blocks and columns strewn about the quarry pits. The actual quarries are more difficult to see because of the rugged terrain, and one must stand almost directly on top of a pit to identify it individually.

Numbers and dimensions of quarries: 15 small pits are scattered down the slope in a straight line, with 368 m between the uppermost and lowest. Pits 1–5, 7–8, and 13–15 are ca. 0.50 m deep and are under 100 m^2 in surface area. The largest pits, Quarries 6 and 9–12, are more than 2 m deep and have surface areas between 100 and 200 m^2.

Quarry 1: 69 m^3

Quarry 2: 29 m^3

Quarry 3: 95 m^3

Quarry 4: 78 m^3

Quarry 5: 30 m^3

Quarry 6: 117 m^3

Quarry 7: 69 m^3

Quarry 8: 68 m^3

Quarry 9: 176 m^3

Quarry 10: 340 m^3

Quarry 11: 170 m^3

Quarry 12: 105 m^3

Quarry 13: 35 m^3

Quarry 14: 62 m^3

Quarry 15: 52 m^3

Capacity: ca. 750 m^3; ninth largest quarry complex

Geological age, grain size, and color: Mesozoic. Medium to coarse grained. Thinly bedded and weakly metamorphosed breccia; surface is weathered and friable. Dark blue-gray color, interspersed with large white clasts. While the marble is of the same geological age and formation as that quarried on the south side of the valley, it differs in both appearance and texture. Continual exposure to mountaintop storms may contribute to rough and pockmarked character of the stone. At Baba Dağı the blue-gray color is grayer than the Paleozoic marble at Yazır, and it is brecciated rather than mottled.

Modern quarrying: None.

Joints and quality of marble: Joint spacing appears to range from 1.0 m to 1.5 m, but one abandoned column is 3.70 m long, so the marble quality is high. As also observed in the Çamarası Quarry, a small pit could yield a large block if the bed struck upon was homogenous and thick.

Quarry organization and evidence for extraction: Majority of pits are V-shaped in plan with two quarry faces; several are bowl-shaped, and one is square. Very little debris is deposited in or around quarries, as erosion carried most scree down the slope. Evidence

for ancient working is limited to pickmarks on the floors and faces of Quarries 8–10 and an unfinished wedge hole with point-chisel marks in Quarry 14.

Blocks: Eight large, rectilinear unfinished blocks abandoned in quarries. The blocks were cut with stepped surfaces on one or two sides and were intended as wall veneer.

Eleven unfinished columns are concentrated in the largest pits, Quarries 5 and 8–10. The columns vary in length (1.56 m to 3.70 m) and in diameter (0.36 m to 0.70 m); two sets of paired "bundled" columns are also preserved (L: 1.97 m, Diam: 0.80 m; and L: 1.20 m, Diam: 0.84 m). Multiple columns were sometimes roughed out from a single large block and left bundled to protect them from breakage during transport; the columns would later be separated and finished on-site.

Transportation: There is a 130 m drop in elevation from the top of Quarry 1 to the bottom of Quarry 14, a 19˚angle (38% grade), which would have made transporting materials out of the quarry extremely burdensome.

General Discussion

The limited capacity of these quarries suggests they were used to supply materials for a small number of specific building projects, possibly at Aphrodisias or alternatively at Herakleia Salbake at the northwest edge of the plain of Tabae. The quarry appears to have been opened primarily for the extraction of columns and large blocks, which may have been intended for revetment panels. As seen at numerous sites across the empire and at Rome itself, colored monolithic columns were in great demand in the High Imperial period. This fashion explains why the quarry was opened up in such an

improbable location. At the time of this writing, Baba Dağı marble has not been securely identified in archaeological contexts at Aphrodisias.

A number of differences can be observed in the organization of these quarries in comparison with the other regional quarries, such as the abandonment of undamaged, prefabricated blocks, the V-shaped layouts of the quarry pits, and the difficult transportation setting. These variations may be due to differences in management if these quarries belonged to another entity. The abandoned blocks may have remained unsalvaged simply because transportation down such a steep incline was too difficult and dangerous.

8. Çamova Tepe Quarries (F073) (Fig. 3.40)

Location: On the southeast portion of the Kara Baba Dağı ridge along the tree line, due north of the village of Karahısar; 22 km from Aphrodisias. Elevation ca. 1,475 masl. Road running northeast from Yahşiler leads directly to the quarry, snaking dramatically through the lower spurs of Baba Dağı. Quarry opens to the south/southeast, and site offers panoramic view of the plain of Tabae. Largest quarry visible from access road, others obscured by hills.

Numbers and dimension of quarries: Three small quarries in a single district situated on the west side of the hill.

Quarry 1: H: 10 m, W: 20 m, D: 10 m, Vol: 2,000 m^3

Quarry 2: H: 3.0 m, W: 12 m, D: 8.0 m, Vol: 288 m^3

Quarry 3: H: 5.0 m, W: 15 m, D: 10 m, Vol: 750 m^3

Capacity: ca. 3,050 m^3; eighth largest quarry complex

Geological age, grain size, and color: Mesozoic. Fine to medium grained. Bright white and grayish purple breccia, very similar in appearance to lower grade the purple and white marble from Dokimeion.[223]

Modern quarrying: Burdur Mermer of Afyon and Koca Ökuz Mermer are currently engaged in extraction of white marble above ancient quarries.

Joints and quality of marble: Subhorizontal/subvertical joints, from 0.5 to 1 m wide. Medium quality.

Quarry organization and evidence for extraction: The quarries are strung along the ridge of hill running northeast to southwest. Quarry 1, the largest, is a steep-sided semicircular bowl, with a series of worked steps undercut from the quarry face; the steps measure up to 7 m long and are lined with horizontal pickmarks. Directly below these, a subvertical joint was followed at 60˚ angle down to the quarry floor. Pickmarks and vertical separating channels line the sides of the quarry. The floor is filled with marble scree and small stones. Blocks were moved out of the back of the quarry along level slipway that bypasses Quarries 2 and 3.

Quarry 2 lies directly north of Quarry 1 and is a shallow bowl-shaped quarry. Preserved evidence of ancient quarrying includes pickmarks, separating channels, and in one place a regular line of fine-point chisel marks, as also seen in Ören Quarry 7. In one area, separating trenches define a large block (H: 1 m, W: 2.95 m, and D: 2.6 m).

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[223] M. Waelkens, "Carrières de Marble en Phrygie," Bulletin des Musées royaux d'art et d'histoire, Bruxelles (1982) 33–55.

Quarry 3 lies behind and north of Quarry 2 and is a medium-sized square quarry. Ancient pickmarks preserved on the quarry face. The numerous joints make the marble quality lower than at the other two quarries. The floor is filled with marble scree.

Blocks: Four abandoned rectangular blocks in Quarries 2 and 3.

Transportation: It is possible that the easiest route for transportation was down the several-hundred-meter draw between foothills before reaching the plain of Tabae.

General Discussion

At Aphrodisias, contexts for marble resembling that at Çamova Tepe are limited to revetment from the Civil Basilica, Bouleuterion, and the Late Antique domestic quarter in the northeast sector (NES). The scale of the quarry suggests regional use, and it is possible that the quarry served other regional cities besides Aphrodisias, such as those in the plain of Tabae.

CHAPTER 4

RESOURCES OF ASIA MINOR AND DOKIMEION: PRODUCTION, PROFIT, AND TRADE

MARBLE RESOURCES OF ASIA MINOR

The size and geology of Asia Minor meant that the number and variety of regional stone resources was rivaled only by Egypt (Fig. 4.1). By the Roman period, an enormous international market for colored stone had developed alongside the long-standing and local practice of extracting white marbles for civic adornment. *Marmor Chium* (*portasanta*) from the island of Chios, *Marmor Luculleum* (*africano*) from Teos, *Marmor Phrygium* (*pavonazzetto*) from Dokimeion, *Troadense* (*granito violetto)* near Alexandria Troas/Troy, *Marmor Misium* near Pergamon, *Marmor Lesbium* (*bigio antico*) on the island of Lesbos, and *Marmor Iasense (cipollino rosso, rosso brecciato*) from Iasos were among the major colored sources exploited in the Roman period, and their ubiquitous use in building and decoration across the Roman Empire attest their popularity.

Two sources of white marbles in Asia Minor grew into the largest exporting quarries of the Roman world, the *Marmor Proconnesium* of the island of Marmara, and the white variety found at Dokimeion. Some white marbles associated with Aegean

urban centers also seem to have achieved export-status, such as the string of quarries supplying Ephesus, and those located along the southern side of Bafa Gölü suppying Miletos, Priene, and Herakleia-on-Latmos. Their preserved size indicates that they served more than a local market, and scientific provenancing studies seem to confirm that they were exported regionally.[224] This chapter provides a brief sketch of the major Anatolian quarries that emerged onto the export scene, and is intended as a comprehensive gazetteer as well as a generalized account of their operations, organization, and distribution. An examination of the quarries, known to have exported materials, provides a framework for investigating quarries located in the territories of cities, whose distribution is less than certain.

Geology of Asia Minor

Understanding regional geology is important because it provides an explanation for the nature of stone deposits in a given region. Marble beds formed in the same geologic age can stretch over hundreds of miles; they can come to the earth's surface either as contiguous deposits or as pockets spread throughout a given formation. The principal quarries of Asia Minor, with several notable exceptions, exploited the sedimentary, metamorphic, and igneous rocks found in the Menderes massif of central western Turkey (Fig. 4.2). The Menderes massif is the largest metamorphic *terrane* (a continental fragment characterized by limestones formed in marine environments) in Turkey, covering an area of 40,000 km^2, and encompasses the majority of the famous

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[224] T. Cramer, "Petrographic and Geochemical Characterization of the Pergamon Altar Marble in the Pergamon Museum, Berlin," in L. Lazzarini (ed.), ASMOSIA VI (Padova 2002) 285-292.

ancient cities and quarries of western Turkey.[225] It is characterized by a series of east to west *grabens* (a valley formed by the down-dropping of the valley floor along faults) and contains the large valleys of the Maeander, Cayster, and Hermos rivers, surrounded by high mountains rich in natural building stone. The marbles found here were formed in the Mesozoic and Paleozoic ages, range in thickness from 1,000 to 3,000 m, and are composed of two calcitic marble-bearing units.[226] The upper series are thickly-bedded, coarse grained with some dolomite, while the lower series are more thinly-bedded, and interbedded with metabauxites.

The bedrock geology of the Menderes massif is complicated. Several emplacement zones were thrust over it during the later stages of the Alpine *orogeny* (the process of mountain-building) in the Early Tertiary period. For example, Ephesus lies between two major geologic metamorphic zones - the Menderes massif on the west and the Cycladic complex on the east (the Cycladic complex includes many of the Aegean Cycladic islands). Because the precise contact location of these zones is difficult to determine as a result of the deposition of alluvial sediment from the Cayster river, the marbles exploited in antiquity may belong to either formation.[227] To the south, the Lycian *nappes* (a large body or sheet of rocks that has been moved by folding or faulting over long distances) crop up throughout the southern portion of the Menderes massif.[228] The Lycian nappes include clay-rich marine clastics referred to as *flysch*, as well as

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[225] M. Higgins and R. Higgins, A Geological Companion to Greece and the Aegean (1996).
[226] A. Okay, "Geology of the Menderes Massif and the Lycian Nappes South of Denizli, Western Taurides," Bulletin of the Mineral Research and Exploration 109 (1989) 37-51.
[227] A. Okay, "Stratigraphic and Metamorphic Inversions in the Central Menderes Massif: A New Structural Model," International Journal of Earth Sciences 89 (2001) 709-727.
[228] T. Güngör and B. Erdoğan, "Emplacement Age and Direction of the Lycian Nappes in the Söke-Selçuk Region, Western Turkey," International Journal of Earth Sciences 89 (2001) 874-882.

carbonates (e.g. limestone and marble) and ophiolites, and were exploited in the region between Aphrodisias and Hierapolis.[229]

Although the stratigraphy of the other major Turkish marbles exploited outside the Menderes massif has never been studied in detail, it is possible to identify their location within major geologic units. In north-western Asia Minor, the Izmir-Ankara suture and Sakarya zones are characterized by limestones and volcanic rocks with small outcrops of granite and, more rarely, marble.[230] The marbles found on the islands of Lesbos and Marmara (Proconnesos) lie within the Sakarya zone and underwent medium pressure/temperature conditions during deformation with the result that the entire northern half of the island of Marmara is composed of medium-grained calcitic and dolomitic marbles.[231] The famous limestone breccias of ancient Bithynia are found between the Istanbul terrane and the Sakarya zone.[232] The Central Anatolian Afyon zone forms a narrow band north of the Menderes massif; the Mesozoic and Paleozoic Dokimeion marbles lie within this zone. The fine-grain marble characteristic of Dokimeion shows that they experienced a low-grade medium to high pressure metamorphism (*grade* refers to the degree of metamorphism in the rock, determined by

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[229] C. Stearns,"Geoarchaeological Investigations of the Aphrodisias Regional Survey," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).
[230] M. Higgins and R. Higgins, A Geological Companion to Greece and the Aegean (1996) 130-137.
[231] D. Attanasio, M. Brilli, and M. Bruno, "The Properties and Identification of Marble from Prokonessos (Marmara island, Turkey): A New Database including Isotopic, EPR, and Petrographic Data," Archaeometry 50.5 (2008) 747-774.
[232] L. Lazzarini, "The Origin and Characterization of *Breccia Nuvolata*, *Marmor Sagarium* and *Marmor Triponticum*," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 58-67; A. Okay, "Geology of Turkey: A Synopsis," Anschnitt 21 (2008) 25-28.

the maximum temperature and pressure the marbles experienced and the subsequent degree of recrystallization).[233]

Types, organization and distribution

Internationally-recognized colored stones were located in the territories of several coastal Aegean cities of moderate size and administrative importance (Fig. 4.3). Their proximity to well-equipped harbors, however modest, seems to have been sufficient to facilitate the export of local materials. In Caria, an important source of red marble was located near the town of Iasos.[234] *Marmor Carium*/*Iasense* (*cipollino rosso* or *Africanone)* comes in three varieties. A red, pink, and white veined form, the most common type, was used for columns and revetment; a red, white, and purple breccia was used for revetment and table legs; and a homogenous red form was used exclusively for statuary. While the marble was exploited as early as the Hellenistic period, it reached a zenith in popularity in Late Antiquity because of its Christian symbolic association with the concept of the flesh of martyrs.[235] Contexts for these three varieties are limited to the central and eastern Mediterranean; the marble is associated with Late Roman imperial monuments.

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[233] A. Okay, "Geology of Turkey: A Synopsis," Anschnitt 21 (2008) 30. Grain size in marble is controlled by temperature and deformation. Coarse grained marbles experienced high temperatures and low deformation rates, while fine grained marbles experienced low temperatures with high deformation. Grain size in the volcanic rocks, such as granites, is determined solely by the duration of time during cooling. Fine grain granites experienced a fast rate of cooling, while medium to coarser grain granites cooled at a slower rate.

[234] A. Andreoli, F. Berti, L. Lazzarini, R. Benoit, "New Contributions on Marmor Iassense," in L. Lazzarini (ed.), ASMOSIA VI (2000) 13-18.

[235] Paul the Silentiary and Constantine the Rhodian.

On the Aegean island of Chios, *Marmor Chium (portasanta)*,[236] located at Latomi, is a brecciated pink, red and white marble that was used locally since the fourth century B.C. It was widely traded during the imperial period and into Late Antiquity, and used mainly for revetment and columns in the cities of western Asia Minor, the Aegean, Italy, and Spain. On the northeastern section of the island in the Margaritis peninsula near the village of Marmairo, was a small black limestone quarry, and it may have been one of the many ancient black marbles (*nero antico*) exported during the Roman period.[237]

In Ionia, *Marmor Luculleum*, and what Italian stone masons termed *africano*, ranges from a red, pink, purple or white breccia filled with black veins, or alternatively, a light green with dark green or white inclusions; these varieties have been securely identified with a the ancient quarries at Teos, located on the south coast of the peninsula stretching to the west of Izmir.[238] *Marmor Luculleum* was among the smaller, internationally-prized quarries, a fact confirmed by the limited number of findspots, epigraphic evidence, physical size of the quarries, and the availability of geological deposits.[239] The ancient sources that mention the marble include Dio Chrysostom Orations 79.2, Pliny Natural History 36.2.6, 36.7.49-50, and Diocletian's Edict on Maximum Prices). Pliny says that the marble's namesake was the Late Republican

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[236] I include the marbles of several Aegean islands (Chios and Lesbos) in this discussion since they were a part of the Roman province of Asia.

[237] Investigation of black marble sources is currently ongoing, and several Italian researchers have located at least 4 other sources throughout the Mediterranean, so it remains to be seen if the black marble from Chios was exported. For a discussion of current issues with the identification of black marbles, see M. Brilli, F. Antonelli, F. Guistini, L. Lazzarini, and P. Pensabene, "Black Limestones Used in Antiquity: The Petrographic, Isotopic and EPR Database for Provenance Determination," Journal of Archaeological Science 37.5 (2010) 994-1005.

[238] N. Türk, S. Çakıcı, D. Uz, S. Akça, and K. Geyik, "The Geology, Quarrying Technology and Use of Beylerköy Marbles in Western Turkey," N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 85-89.

[239] Türk estimates 3,500 m^3 of usable blocks were taken from the quarry.

general Lucullus, who had a hand in opening the quarries; an assertion the subject of debate.[240] The marble has often been confused with those from Chios because the marbles in both regions display remarkable variations in color.[241] The marbles were exported most extensively from the Augustan to Antonine period to all provinces, and particularly to Italy.[242]

Marmor Misium, named after the ancient region, Mysia, of which Pergamum was the principal city, is found near the modern town of Kozak.[243] *Marmor Misium* was, in fact, a granite, and was one of two important ancient types of granite found in Northwestern Turkey that rivaled the famous granites of the Eastern Egyptian Desert. It is a gray stone with a fine grain size, characterized by "white feldspar and plagioclase, black mica, hornblende and colorless quartz."[244] Used locally as early as the Late Hellenistic period, Pergamene granite was traded on a moderate scale to Sicily, Italy, North Africa, and the Near East for monolithic columns and revetment slabs in the later imperial period and into the early Byzantine period.

Further north in the Troad, a distinctive gray and purple medium-grained granite named *Marmor Troadense* (*granito violetto*) was quarried on several locations on the slopes of Mount Çigri, 24 km south of ancient Troy.[245] It is distinguishable from

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[240] M. Ballance, "The Origin of *Africano*," Papers of the British School at Rome 34 (1966) 79-81.
[241] A. Dworakowska, "Once again on Marmor Luculleum," in M. True and J. Podany (eds.), Art Historical and Scientific Perspectives on Ancient Sculpture (Malibu 1990) 253-262.
[242] L. Lazzarini "The Mediterranean Distribution of the Most Important Stones of Roman and Medieval Antiquity," in Y. Maniatis (ed.), ASMOSIA VII (2009) 463.
[243] L. Lazzarini, "Sul Marmo Misio, uno dei Graniti più Usati Anticamente," in P. Pensabene (ed.), Marmi Antichi II (Roma 1998) 165-174.
[244] G. De Vecchi, L. Lazzarini, T. Lünel, A. Mignucci, and D. Visonà, "The Genesis and Characterisation of 'Marmor Misium' from Kozak (Turkey), a Granite Used in Antiquity," Journal of Cultural Heritage 1 (2000) 145-153
[245] Research on the quarries has been conducted by G. Ponti and M. Satir, "Geological Aspects of the Use of Kestanbol Quartzmonzonite Intrusion (Troas/Turkey) as Constructing Material in Archaeological Sites

Marmor Misium by the presence of a violet instead of white-colored feldspar. It was exploited mainly for the production of monolithic columns, and 21 columns, half of which measure 11.50 m, were abandoned in the ancient quarries at Yedi Taşlar and Uluköy. Three fully-finished monolithic columns left on a jetty of the now-silted harbor at Alexandria Troas suggest that the materials were hauled 10 km from the quarry to the port and then loaded onto cargo ships. The granite, already in use in local contexts in the Archaic-Hellenistic periods, was exported most extensively in the second century A.D. and distributed widely throughout the Mediterranean to Troy, Ephesus, Smyrna, Leptis Magna, Rome, Tarraco, and Palmyra and Baalbek.[246] The quarries remained active well into the Late Roman period; the Theodosian Code excludes contractors working the Troad quarries, along with those at Dokimeion and Proconnesos, from the cancellation of debts.[247]

On the Aegean island of Lesbos, the extraction of the fossiliferous blue-grey *Marmor Lesbium* (*bigio antico*) continued into the Roman period at Moria, north-west of Mytilene.[248] At around 40 denarii a cubic foot, it was one of the cheapest marbles listed

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around the Mediterranean Sea," Studia Troica IV (1995) 143-155; G. Ponti, "Marmor Troadense – Granite Quarries in the Troad. A Preliminary Survey," Studia Troica V (1995) 291-320; L. Lazzarini "The Mediterranean Distribution of the Most Important Stones of Roman and Medieval Antiquity," in Y. Maniatis (ed.), ASMOSIA VII (2009) 463.

[246] L. Lazzarini, "The Distribution and Re-use of the Most Important Colored Marbles in the Provinces of the Roman Empire," in Y. Maniatis (ed.), ASMOSIA VII (2003) 462.

[247] Codex Theodosianus 11.28.9.

[248] R. Millar and H. Williams, "The Roman Quarry at Moria, Mytilene," Echos du Monde Classique/Classical Views 37 (1993) 211-224. L. Lazzarini, "Isotopic and Petrographic Characterization of *Marmor Lesbium*, Island of Lesbos, Greece," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (1999) 125-129.

in the Price Edict; used mainly for architectural adornment, it was exported to nearly every province in the Roman world.[249]

The largest-known quarry of the Roman world, covering an immense area of 40 km^2, is found on the northern half of the island of Proconnesos in the Propontis.[250] The quarries furnished a visually distinctive white medium grained marble with parallel bands of dark blue or gray, and have been exploited continuously from the fourth century B.C. to today. Asgarı identified hundreds of ancient extraction sites concentrated in five main quarrying areas within easy reach of the island's main ancient harbor at Saraylar.[251] Vitruvius' On Architecture 2.8.10 and Pliny's Natural History 32.15.1 provide an account of the importation of architectural elements to Mausolus' residential palace at Halicarnassos, and demonstrate that the stone may have been exported as early as 353 B.C. Geochemical tests performed on the samples taken from the Pergamon Altar in Berlin indicate that Proconnesian marble was the main source for one of the Hellenistic world's most iconic monuments.[252] The bulk of archaeological and epigraphic evidence points to the mid-second century through the mid-sixth century A.D. as the most extensive period of exploitation.[253] The shipment of architectural elements and a variety of sarcophagi types reached nearly every corner of the Roman Empire.[254] Proconnesian

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[249] L. Lazzarini, "The Distribution and Re-use of the Most Important Colored Marbles in the Provinces of the Roman Empire," in Y. Maniatis (ed.), ASMOSIA VII (2003) 464, 477.
[250] The modern Turkish name for the sea, *Marmara* (marble), takes its name from the quarries.
[251] N. Asgarı, "The Roman and Early Byzantine Marble Quarries of Proconnesus," in E. Akurgal (ed.), Proceedings of the 10th International Congress of Classical Archaeology (Ankara 1979) 467-480.
[252] T. Cramer, "Petrographic and Geochemical Characterization of the Pergamon Altar Marble in the Pergamon Museum, Berlin," in L. Lazzarini (ed.), ASMOSIA VI (Padova 2002) 285-292.
[253] N. Asgarı and T. Drew-Bear, "The Quarry Inscriptions of Prokonnesos," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (2002) 1-19.
[254] N. Asgarı, "Objects de Marbre Finis, Semi-Finis et Inachevés Proconnèse," in M. Waelkens (ed.), Pierre Eternelle du Nil au Rhin: Carrieres et Prefabrication (Bruxelles 1990) 107-126; H. Dodge and B. Ward-

marbles took over the market in both the western and eastern Mediterranean, eclipsing the trade already established in Pentelic and Carraran marbles.[255] A recent provenancing study on marbles used in the major imperial buildings in Rome showed that the use of Proconnesian marbles soared from ten per cent to 50 per cent during the Flavian to the Trajanic-Hadrianic periods, and to almost 100 per cent in the Antonine and Severan periods.[256] The great building projects of the Temple of Venus and Rome, the Hadrianeum, the Temple of Antoninus and Faustina, the Arch of Septimius Severus, the Baths of Caracalla in Rome made extensive use of Proconnesian marbles, and many of the monuments of Severan Lepcis Magna were constructed from Proconnesian marble.[257] The marble was the building material *par excellence* for fashioning the new capital city at Constantinople.

Provenancing studies show Proconnesian marble was extensively used by private citizens (for sarcophagi) and municipalities (for civic building).[258] Gregory of Nazianzus alludes to these commercial transactions in two lines of a poem in which he describes a priest from the town of Thasos, who came to Constantinople with money

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Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992).

[255] S. Walker, "From the West to East: Evidence for a Shift in the Balance of Trade in White Marbles," in N. Herz and M. Waelkens (eds.), ASMOSIA I (1988) 187-195.

[256] M. Bruno, S. Cancelliere, L. Conti, P. Pensabene, L. Lazzarini, P. Pallante, and B. Turi, "Provenance and Distribution of White Marbles in Temples and Public Buildings of Imperial Rome," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (2002) 289-301.

[257] For a summary, see D. Attanasio, M. Brilli, and M. Bruno, "The Properties and Identification of Marble from Proconessos (Marmara island, Turkey): A New Database including Isotopic, EPR, and Petrographic Data," Archaeometry 50.5 (2008) 752-754.

[258] See J. Zöldföldi and M. Satir, "Provenience of White Marble Building Stones in the Monuments of Ancient Troia," in G. Wagner, E. Pernicka, and H. Uerpmann (eds.), Troia and the Troad: Scientific Approaches (Berlin 2003) 203-222; T. Cramer, Multivariate Herkunftsanalyse von Marmor auf Petrographischer und Geochmeischer Basis, Ph.D. dissertation (Berlin 2004).

from his church to buy Proconnesian slabs.[259] A trade outside of imperial consignments may account for the fact that inscribed items were found on only ten per cent of the artifacts abandoned in the quarries.[260]

The scores of abandoned artifacts roughed out in the Proconnesian quarries (over 400 pieces) illustrate the sequence of production more vividly than all other ancient marble production centers. Asgarı was able to identify various stages of workmanship on sarcophagi, sculptures, and architectural elements (architraves, capitals, bases and column shafts). Her work on Corinthian capitals showed that they were usually shipped out in a half-finished quarry-state and that the finishing touches were put on elsewhere.[261] The 112 fragments of sarcophagi abandoned in the quarries attest to the production of at least five different body and two different lids types.[262] They were carved to a certain degree before export, but do not seem to have been shipped out fully-finished; even blank-chests were exported so that the local workshops could add decorations locally in vogue. Among the column shafts abandoned in the quarries, only four of 41 were fully finished, four had protective collars left on the ends, while the rest were abandoned in various states of un-finish and of no standardized dimensions; the most impressive of these was an enormous drum intended for Theodosius I's Triumphal Column in

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[259] Gregory of Nazianus, Carmen de Vita Sua 875-877.
[260] N. Asgarı and T. Drew-Bear, "The Quarry Inscriptions of Prokonnesos," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (2002) 1-19.
[261] N. Asgarı, "The Stages of Workmanship of the Corinthian Capital in Proconnesus and its Export Form," in N. Herz and M. Waelkens (eds.), ASMOSIA I (1988) 115-126.
[262] N. Asgarı, "Objects de Marbre Finis, Semi-Finis et Inachevés Proconnèse," in M. Waelkens (ed.), Pierre Eternelle du Nil au Rhin: Carrieres et Prefabrication (Bruxelles 1990) 110-116; G. Koch and H. Sichtermann, Römische Sarkophage (Munich 1982) 484-491. The finishing of half-carved Prokonnesian sarcophagi are best-illustrated in the necropoleis of Calcedon: N. Asgarı and N. Fıratlı, "Die Nekropole von Kalchedon," in S. Şahin, E. Schwertheim and J. Wagner (eds.), Studien zur Religion und Kultur Kleinasiens (Leiden 1978) 1-92.

Constantinople that was never detached from the bedrock.[263] The absence of consistent measurements or proportions between individual Corinthian capitals, column shafts, or column bases led Asgarı to believe that pieces were not prefabricated or stockpiled in large numbers in anticipation of an order, but rather that measurements were specified by the client and customized on an *ad hoc* basis for specific projects.[264] Much has been made of an unfinished and abandoned Corinthian capital made from limestone from the region of Aurisinia. The western composite form indicates it was imported as a pattern for the manufacture of capitals intended for a building project in Aquileia.[265] Proconnesian workers may have used it as a model to produce capitals that were shipped out in an unfinished state to be finished later in workshops by specialized workers.

Evidence from shipwrecks has proved many of Asgarı's theories on the exportation of unfinished items in Proconnesian marbles correct. Isotopic analysis show that the unfinished Doric capital and column drums aboard the Kızılburun shipwreck (300-250 B.C.) - intended for the Temple of Apollo at Claros - came from Proconnesos; the Şile shipwreck (A.D. 100-125) carried an unfinished sarcophagus lid, several statues, as well as column bases, columns, and Ionic capitals in various stages of workmanship; the Punta Scifo A wreck (early third century A.D.) bore unfinished Proconnesian marble blocks; the Capo Granitola A shipwreck (A.D. 225-275) carried a load of 67 Proconnesian blocks in their quarry state; and the Marzamemi Wreck off the coast of

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[263] N. Asgarı, "Observations on two Types of Quarry Items from Proconnesus: Column-shafts and Column-bases," in M. Schvoerer (ed.), ASMOSIA IV (Leuven 1992) 73-80.
[264] N. Asgarı, "Observations on two Types of Quarry Items from Proconnesus: Column-shafts and Column-bases," in M. Schvoerer (ed.), ASMOSIA IV (Leuven 1992) 74.
[265] L. Lazzarini, "Marmi Antichi," Bollettino di Archeologia 5/6 (1990) 259-260; G. Plattner, "Transfer von Architekturkonzepten und Ornamentformen zwischen Kleinasien und Rome in der Kaiserzeit," Römische Historische Mittelungen 46 (Wien 2004) 27-29.

Sicily (A.D. 527-565) was laden with enough materials to build an entire basilica, and included slabs, screens, an altar, ambo and more than two-dozen columns with protective collars, bases, and capitals.[266] The success of the operations at Proconnesos has been attributed to its coastal location, a huge workforce, and the practice of exporting roughed-out products. These factors allowed for a drop in production costs, a fact that may be confirmed by Diocletian's Edict, which lists Proconnesian marble as one of the cheapest available on the open market.

The province of ancient Bithynia furnished several colored marbles to the international market. Two varieties of *Marmor Sagarium (breccia corallina* and *broccatellone)* located 30 km to the southeast of ancient Nicaea were exploited from the Late Augustan period to the end of the empire.[267] Limestones classified as *breccia corallina* have either white clasts set in a red cement or a yellow-matrix with wavy lines of a deeper pink or yellow.[268] *Breccia corallina* was widely diffused throughout Asia Minor, Italy, and North Africa and was used predominately for medium-sized columns, tondos, and revetment. L. Lazzarini proposed that a marble called *Marmor Triponticum* in Diocletian's Edict corresponds to a pink-beige or red-brown fossiliferous stone named

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[266] D. Carlson and W. Aylward, "The Kızılburun Shipwreck and the Temple of Apollo at Claros," American Journal of Archaeology 114.1 (2010) 145-159; M. Beykan, "The Marble Architectural Elements in Export-form from the Şile Shipwreck," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 127-137; P. Pensabene, "A Cargo of Marble shipwrecked at Punta Scifo near Crotone (Italy)," The International Journal of Nautical Archaeology and Underwater Exploration 7.2 (1978) 105-118; for the Capo Granitola A wreck, see G. Purpura "Un Relitto con un Carico di Marmo a Capo Granitola," Sicilia Archeologica 10.33 (1977) 55-59; for the isotopic analysis of the remains, see L. Lazzarini, G. Moschini, and B. Stievano, "Alcuni Esempi di Identificazione di Marmi Antichi Mediante uno Studio Petrografico e la Determinazione del Rapporto Ca/Sr," in Quaderni della Soprintendenza ai beni Artistici e Storici di Venezia 9 (Venice 1980) 34-51; Christograms allow the wreck to be dated to the reign of Justinian I, see G. Kapitän, "The Church Wreck of Marzamemi," Archaeology 22 (1969) 122-33.

[267] L. Lazzarini, "The Origin and Characterization of *Breccia Nuvolata*, *Marmor Sagarium* and *Marmor Triponticum*," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 58-67.

[268] The former variety was previously known as *breccia nuvolata* until Lazzarini identified it as a type of *Breccia Corallina* by petrographic and isotopic analyses.

occhio di pavone and that these ancient quarries are located near Kutlaca, 20 km northwest of Nicomedia. Distribution studies show that the marble was traded in the central and eastern Mediterranean from the third century onwards as columns, and revetment. It was used most extensively in the Byzantine period, as late as the tenth century A.D., and literary sources associate it with Christianity and immortality of the soul.[269] Located near four waterways (the Sangarius river, the Sophon lake, the Black and Marmara seas), these Bithynian marble varieties were likely transported along them to Nicomedia, the largest harbor city in the region.

In Marmi Antichi, the authors list 9 other colored marbles that possibly originated in Asia Minor: *alabastro fiorito, bianco e nero tigrato, bigio antico, breccia oolitica o nummuliticia, breccia pavonazza*, *breccia policroma capitolina, breccia policroma lucullea, breccia policroma di s. Bernardo,* and *lumachella o madreporite rossa di sibilio*.[270] These stones have been documented in Italian contexts, but the location of their associated quarry sites are unidentified and their distribution patterns unknown. The present state of scholarship on the colored types of marbles in Asia Minor shows that the task of identifying quarries in the field is far from finished.

THE DOKIMEION QUARRIES

Geographic and historical background

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[269] L. Lazzarini "The Mediterranean Distribution of the most Important Stones of Roman and Medieval Antiquity," in Y. Maniatis (ed.), ASMOSIA VII (2009) 463.
[270] G. Borghini (ed.), Marmi Antichi (Roma 2004).

Turing to one of the most important ancient exporting sources, the quarrying district of Dokimeion, one km to the southeast of the modern town of Iscehisar, lies in the heart of the Anatolian plateau in the ancient province of Phrygia, which is now the Turkish province of Afyon (Fig. 4.4). These quarries are important to this study for a number of reasons. Despite the fact that they were isolated, located deep in the formidable Anatolian heartland, the quarries grew into spectacular affairs, rivaling the largest extractive operations of the Roman world, and defying any sense of economic rationality. Moreover, the body of literary epigraphic and archaeological evidence illuminates the enterprises of an internationally-exporting quarry in greater detail than other quarries in Asia Minor of a similar status. An abundance of quarry labels sheds considerable light on quarry administration and operations, and the types of goods produced in the Dokimeion workshops are well-documented. Because the purple and white marble from Dokimeion is easily recognizable and the exported blocks are often accompanied with quarry labels, distribution patterns and dates can be securely identified. Additionally, Dokimeion artisans regularly signed their names on sculptures, and these signatures provide important comparanda for understanding the signatures of Aphrodisian craftsmen.

Dokimeion's historical importance has been known since the eighteenth and nineteenth centuries when European travelers first visited the site.[271] Since this time, the quarries have been surveyed, although excavations within the quarries or in the nearby city have never been undertaken. The nearly 450 inscribed blocks abandoned in the

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[271] W. Hamilton, Researches in Asia Minor, Pontus, and Armenia (London 1842); W. Ramsay, "Inscriptions Inédites de Marbres Phrygiens," Mélanges d'Archéologie et d'Histoire 2 (1882).

quarries at Dokimeion received the attention of renowned epigraphists of the early twentieth century, and consequently are very well-documented.[272] L. Robert's epigraphic and photographic documentation and J. Röder's quarry survey provide the only visual records of the Roman quarries at Dokimeion, which have been substantially destroyed by modern activities.[273]

Strabo's designation of the village as a *κώμη* instead of as a *polis* indicates that it was a small, rural settlement in the Hellenistic period.[274] Second and third century A.D. inscriptions mention the founder, *Dokimos*, an Antigonid general who controlled Synnada in the third century B.C. and coins minted under the Roman empire issued in the name of the "Macedonians of Dokimeion" refer to the settlers who came to the region in the wake of Alexander the Great's campaigns.[275]

That the wealth of Phyrgia lay in its land is attested by the fourth century A.D. writer, Claudian: "[Phyrgia] is a sun-kissed plain; it is entwined by close-packed vines and raise the fruit of the silvery-olive; they are rich in horses, abundant in flocks, and valued for their painted marble, which Synnada cuts from its purple veins."[276] The Roman government poured in capital and invested in infrastructure with the aim of

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[272] The blocks have since moved to Iscehisar where they line the main streets and the central square of the town, and are also on display in the Afyon Provincial Museum. M. Christol and T. Drew-Bear, "Documents Latins de Phrygie," Tyche 1 (1986) 39-87; M. Christol and T. Drew-Bear, "Inscriptions de Dokimeion," in B. Remy (ed.), Anatolica Antiqua/Eski Anadolu. Receuil de Travaux Publiés par l'Institut Français d'Études Anatoliennes d'Istanbul (Istanbul/Paris 1987) 83-117; C. Fant, Cavum Antrum Phrygiae: The Organization and Operations of the Roman Imperial Marble Quarries in Phrygia. BAR International Series 482 (1989); M. Christol and T. Drew-Bear, "Les Carrières de Dokimeion à l'époque Severienne," Epigraphica 53 (1991) 113-174; T. Drew-Bear, "Nouvelles Inscriptions de Dokimeion," Mélanges d'Archaélogie et d'Histoire de l'École Française de Rome 106 (1994) 747-844.
[273] J. Röder, "Marmor Phrygium. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 253-312.
[274] Strabo, Geography 12.8.14
[275] L. Robert, A Travers l'Asie Mineure (Paris 1980) 240-243.
[276] Claudian, Against Eutropius II 269-273 (trans. M. Platnauer).

intensive resource-exploitation in both agricultural produce and marble; epigraphic evidence alludes to the vast agricultural estates owned by both imperial and private landowners.[277] The marble quarries may have been administered from Synnada, the chief city of ancient Phrygia 40 km south-west of the quarries, which may explain why the Romans called the marble *marmor Synnadicum*, and the locals, λίθος Δοκιμίτης or Δοκιμαῖον.[278] The marbles are divided into units positioned on top of one another, and in descending order are the famous purple and white marble, a fine grain white, recognizable by its sugary texture and shiny appearance, a gray marble, a honey-colored yellow and white breccia, commonly known in Turkey as *Afyon bal* (Afyon honey), and a blue and white breccia, called *kaplan postu* (tigerskin) (Fig. 4.5).[279]

Importance of the Dokimeion quarries and relevance to this study

Investigation of Dokimeion is fundamental to any study of the marble resources of Asia Minor. Dokimeion marble adorned imperial architecture from the first to third centuries A.D., and was exported widely. The marbles were the focal point of some of Rome's earliest and most ambitious imperial building projects, such as Augustus' Basilica Aemilia and Temple of Mars Ultor, Trajan's Forum, and Hadrian's Pantheon. Scientific analysis suggests that Dokimeion craftsmen played a role in the Emperor Septimius Severus' ambitious architectural reconfiguration of his hometown at Lepcis

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[277] J. Strubbe, "A Group of Imperial Estates in Central Phrygia," Ancient Society 6 (1975) 229-250; B. Levick, S. Mitchell, J. Potter, and M. Waelkens (eds.), Monumenta Asiae Minoris Antiqua Vol. X Monuments from the Upper Tembris Valley, Cotiaeum, Cadi, Synaus, Ancyra and Tiberiopolis (Oxford 1993) xxxiii-xxxv.
[278] Strabo, Geography 12.8.14 and Statius, Silvae 1.5.37-38.
[279] M. Çelik and E. Sabah, "Geological and Technical Characterization of Iscehisar (Afyon-Turkey) Marble Deposits and the Impact of Marble Waste on Environmental Pollution," Journal of Environmental Management 87 (2008) 107-109.

Magna, Libya.[280] Evidence from within the quarries shows the Dokimeion workshops were at the disposal of Roman Emperors. On the basis of similarities in posture, dress, material, and dimensions, M. Waelkens proved that an over life-sized statue of a Dacian prisoner abandoned in the quarries, first discovered by C. Cox in 1926, was bound for Trajan's Forum in Rome as part of the ensemble of Dacian prisoners.[281]

The marble's decorative aesthetic worked on a symbolic level as well, which may explain the impetus behind what C. Fant has termed the "economically improbable phenomenon" of the Roman marble trade. Roman emperors culled marbles from the provinces to symbolize the Empire's extent, power, and ethnically-diverse make-up. The more remote a quarry's location and the more difficult its access, the more valuable and expensive the stone became. Diocletian's Edict on Maximum Prices from A.D. 301 lists Dokimeion *Marmor Phrygium* as the most expensive out of a list of nineteen types of marble, at 200 *denarii* per cubic Roman foot. Literary sources and specific types of statues made from Dokimeion marble suggest that *pavonazzetto* in particular was associated with foreignness, luxury, and prestige. Strabo summarizes the value of the marble:

> On account of the Roman's wealth, large monolithic columns are taken out of Dokimeion (that resemble alabaster in their variety of colors); and so, even though the transport of such loads must be by sea, both columns and *crustae* admirable for their size and beauty are being imported to Rome.[282]

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[280] H. Walda and S. Walker, "The Art and Architecture of Leptis Magna. Marble Origins by Isotopic Analysis," Libyan Studies 15 (1984) 81-92; H. Walda and S. Walker, "Isotopic Analysis of Marble from Lepcis Magna. Revised Interpretations," Libyan Studies 19 (1988) 55-59.
[281] M. Waelkens, "From a Phrygian quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 641-653.
[282] Strabo, Geography 12.8.14 (trans. H. Jones).

The marble's ideological potency is most clearly articulated in sculpture. The purple and white marble from Dokimeion was reserved for depictions of populations subjugated by the Romans, such as the kneeling Persians bearing tripods in the Basilica Paulli near the Forum Romanum and the captured Dacians in Trajan's Forum in Rome, as well as for the local mythical characters associated with Phyrgia, such as Attis and Marsyas.[283] In the case of Marsyas, who was often depicted as being hung up and flayed alive by Apollo, the variegated color may have represented his bloodied body.

Despite the fact that most research has focused on the inscriptions and the use of Dokimeion marble in the imperial building projects of Rome, studies from individual archaeological sites in Asia Minor suggest that Dokimeion was a crucial supplier to regional cities.[284] As a center of production, Dokimeion seems to have acquired a status in the region akin to a brand. Sculptors, who identify themselves as employed by the Dokimeion workshops, tell us that their product was crafted from Dokimeion marble.[285] The financiers of the theater at Hierapolis boasted about the display of the purple and

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[283] For the Basilica Pauli, see Pliny Natural History 36.102, and more generally R. Schneider, Bunte Bardaren. Orientalstatuen aus Farbiger Marmor in der Romischen Reprasentationskunst (Worms 1986) 115-125. For sculptures made in *pavonazzetto*, see individual entries in M. De Nuccio and L. Ungaro (eds.), I Marmi Colorati (Venice 2002). For Attis, see no. 14 and 74; Ganymede, no. 17a; Kneeling Persians, no. 136-138 and 425-432.

[284] D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," The Art Bulletin 9.1 (1926) 5-69; M. Walkens, Dokimeion. Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage (1982); A. Hall and Waelkens, "Two Dokimeion Sculptors in Iconium," Anatolian Studies (1982) 151-155; F. d'Andria and T. Ritti, Hierapolis II. Le Sculture del Teatro. I Rilievi con I Cicli di Apollo e Artemide (Rome 1985); M. Waelkens, Die Kleinasiatischen Türstein. Typologische und epigraphische Untersuchungen der kleinasiatischen Grabreliefs mit Scheintür (Mainz 1986); M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 370-379.

[285] J. Ward-Perkins, "Nicomedia and the Marble Trade," Papers of the British School at Rome 48 (1980) 35-36; A. Hall and Waelkens, "Two Dokimeion Sculptors in Iconium," Anatolian Studies (1982) 151-155; M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, and P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 372-373.

white monolithic columns in the *scaenae frons* of the theater, and the builders at Ephesus regularly adorned important civic buildings with Dokimeion marbles (Fig. 4.6). B. Russell's calculations show that of the 231 catalogued Dokimeion sarcophagi, 187 (81 per cent) never left Asia Minor.[286] The quarries were also a main supplier to marble-poor sites in Pamphylia and Pisidia; the use of Dokimeion marbles at Sagalassos and Pisidian Antioch will be discussed in chapters five and six. While some cities and citizens could afford to buy the marble directly from the quarries, others could not, and had to reproduce Dokimeion-inspired products in local materials, thus spawning a wave of imitations at other smaller production sites across the province. An honorific inscription at Sagalassos says: "Concerning this monument, if it wrongly impresses to be executed in Phyrgian stone, it misleads you. The stone originates locally."[287] Prospectors targeted marbles in the territory of Aphrodisias at Çamova Tepe similar in color to those at Dokimeion, and Aphrodisian craftsmen imitated Dokimeion-type sarcophagi in their own local marbles. While the quarries' international-fame was a source of pride throughout the province, their impact was widespread and the quarries seem to have been instrumental in the development and decoration of urban centers and influential in the dissemination of carving styles. The remainder of this chapter reviews the archaeological and epigraphic evidence from the quarries in an attempt to ascertain the impact of Dokimeion marbles.

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[286] B. Russell, Sculpted Stone and the Roman Economy, Ph.D. dissertation (Oxford 2009).
[287] M. Waelkens et al, "Interdisciplinarity in Classical Archaeology. A case Study: The Sagalassos Archaeological Research Project (Southwest Turkey)," in M. Waelkens and J. Poblome (eds.), Sagalassos IV. Report on the Survey and Excavation Campaigns of 1994 and 1995 (Leuven 1997) 225-252.

Topographical description of the quarries

When I went to the area of the Bacakale quarry in the summer of 2008, several different companies were active there (Fig. 4.7). The quarries were simultaneously an impressive and dangerous place to visit. The earth had been carved away in meandering pockets with precipitous cliffs over a hundred meters deep; heavy machinery, which has replaced the human and animal labor employed in antiquity, created noise and dust; guard dogs roamed the site; and heat emanated from the white marble. Because many of the ancient traces of quarrying have been destroyed within the last few decades, Röder's quarry survey from 1971 provides an invaluable record of the physical remains of the Roman-era quarries; yet even in Röder's time, intrusion was pervasive.[288]

Typical of the quarries is the central and largest region of Bacakale. Quarrying districts also existed to the west and northeast of Bacakale, but these areas were not documented in detail by Röder before being destroyed. Röder created a sketch plan at a scale of 1:1,000 using control points with hand-held equipment. He mapped 13 different areas of extensive ancient exploitation that were concentrated in three main areas and adjacent to one another in an east-west direction. (Fig. 4.8) The westernmost section comprises five districts and was the area where most of the Latin inscriptions were discovered; these quarries are the largest in the series with one measuring 200 m long, 80-110 m wide, and 40-45 m deep and another 130 m long and 60 m wide. Two huge monolithic columns mark the entrance to this section of the quarry today. The quarries were cut into the hillside and arranged in a systematic manner to facilitate the

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[288] J. Röder, "Marmor Phrygium. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 253-312.

organization of extraction. The layout varies considerably, but exhibits an overall consistent pattern. A single pit could be cut into the hillside; a series of quarries linked together could be cut into a parallel line, flush against the hillside; this parallel arrangement could be repeated with the quarries arranged in a series of descending terraces down the hillside. This area includes a series of ancient extraction trenches on the south, and is the only ancient area legally protected from modern quarrying. Modern quarrying has revealed traces of extensive ancient tunnels and the depth of quarries was surely much greater than those observed by Röder. The worked quarry face of this area, which reaches a depth of approximately 100 m below the original ground level, gives some idea of its original scale and appearance (Fig. 4.9).[289] The eastern quarries zones, which are cut into either side of a hill, comprise eight different quarrying areas and preserve both Greek inscriptions and Christian symbols carved onto the quarry faces. The upper portions of the ancient quarries bear evidence of extractive techniques, but have largely been filled in with spoil. Gigantic heaps of spoil, generated as waste and deposited in antiquity, are visible one km to the west of the main quarry district. Röder believed that concentration of rubble in one area indicated a deposit plan, which was a part of an overall design for marble extraction. That quarrying was a massive enterprise is evident from the substantial amounts of stone removed; Röder estimates that at least 500,000 m^3 was extracted from the area of Bacakale alone.[290] Serial numbers left on abandoned blocks (described below) record the annual production rate and help to give

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[289] J. Röder, "Marmor Phrygium. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 253-312.
[290] J. Röder, "Marmor Phrygium. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 269.

an idea about the scale of production: the highest number of blocks was 433 in A.D. 147, while the yearly average was around 250.[291]

Additional quarries in Phrygia

Other quarries in the area, at Altıntaş/Kürd Köy and Çakırsaz (both approximately 50 km NW of Iscehisar) in the Upper Tembris valley, also produced a purple and white marble. These seem to have been subsidiary quarries of the main quarrying operations near Dokimeion.[292] The dates of the inscriptions on the blocks abandoned in the quarries (A.D. 92, 109, 114, 116, and 156) are commensurate with the peak period of production in the main Bacakale quarries at Dokimeion. The Upper Tembris valley quarries may have operated in tandem with those at Dokimeion and were probably opened to relieve the demand for materials. Röder estimates around 150,000 m^3 were removed from the Altıntaş quarries. In addition to the Dokimeion quarries, a number of other regional quarries supplied the ancient Phrygian cities.[293]

Organizational aspects of quarries at Dokimeion

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[291] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – AD 235 (Oxford 2010) 223.
[292] For the most in depth discussion of these quarries, see M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 641-653.
[293] A. Pralong, Trouvailles dans une Carrière Phrygienne Inconnue: Une Inscription Rupestre et un Sarcophage 'in Situ'," Revue Archéologique 2 (1980) 251-262; N. Asgarı, "Uşak Selçikler ve çevresinden Roma çağı Lahitleri ve Mermer Ocakları," Türk Arkeoloji Dergisi 25.2 (1981) 11-48; M. Waelkens, "Carrières de Marbre en Phrygie," Bulletin des Musees Royaux d'Art et d'Histoire (Brussells 1982) 39-41.

Fant undertook a detailed investigation of the inscriptions on abandoned blocks in the Dokimeion quarries.[294] The system of accounting was developed at Dokimeion in the mid- to late first century A.D, and was dropped entirely by A.D. 238 (Fig. 4.10). The dates on the inscribed blocks, in both Dokimeion and the subsidiary quarries in the Upper Tembris valley, show that production peaked around A.D. 100-110 and A.D. 140-160. Of the 450 inscriptions, most are on objects abandoned in the debris piles within the quarries, and in nearly all cases, the inscriptions are limited to the purple and white marble. At the Upper Tembris valley quarries, the purple and white blocks and a handful of white blocks were inscribed. Those found at other sites in the Empire testify to the marble's presence in international trade and the importance of the quarry labels during the different stages of shipment. Inscriptions on architectural pieces from the Hadrianic Baths of Lepcis Magna identify the origin of the blocks as Phrygian. Several ships, wrecked in the early third century A.D. around the rocky southern Italian shores of Punta Scifo (near Croton), carried a marble cargo with a range of inscribed Dokimeion items.[295] Inscribed purple and white pieces have been found in various harbors at Rome, including the blocks located in the marble yards of Rome, and at the ports at Ostia published by Bruzza.[296] It should be said that the practice of labelling was not consistent: not all of the purple and white blocks discovered at Bacakale were inscribed, and uninscribed blocks of *pavonazzetto* were found alongside the inscribed blocks on the Punta Scifo A shipwreck.

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[294] C. Fant, Cavum Antrum Phrygiae: The Organization and Operations of the Roman Imperial Marble Quarries in Phrygia. BAR International Series 482 (1989).
[295] P. Pensabene, "A Cargo of Marble Shipwrecked at Punta Scifo near Crotone (Italy)," The International Journal of Nautical Archaeology and Underwater Exploration 7.2 (1978) 105-118, and more recently, D. Bartoli, Marble Transports in the Time of the Severans: A New Analysis of the Punta Scifo A Shipwreck at Croton, Italy, Ph.D. dissertation (Texas A&M University 2008).
[296] M. Maischberger, Marmor in Rom. Anlieferung, Lager- und Werkplätze in der Kaiserzeit. Palilia 1 (Wiesbaden 1997).

A good deal of literature has been generated on the meaning of the abbreviations inscribed on the quarry blocks, both at Dokimeion and other inscribing quarries. As described briefly in chapter two, the inscriptions record the consular date, the personnel in charge of the quarries, which included a *procurator* (*sub cura procuratoris*), contractors (*ex ratione*), extraction team (*caesura*) and workshop (*officina*), branch (*bracchium*) and the precise location from which the block was extracted (*locus*). While detailed analysis of the inscriptions is beyond the scope of this project, the contrasting interpretations, proposed in an attempt to decode the epigraphic formula, are important here. M. Rostovtzeff, O. Hirschfeld, C. Dubois, and U. Täckholm believed that the quarrying was contracted out to private entrepreneurs, who produced a certain amount of marble in return for payment.[297] In contrast, K. Fitzler argued that the Roman state directly exploited the quarries in Egypt through prisoner and slave labor.[298] Hirschfeld believed that imperial freedman, the *familia Caesaris* (the highly placed and mobile slave class belonging to the Emperor) and elected *procurators* (financial officers in charge of provincial assets, including the collection of taxes, mint, grain supply and mines) oversaw quarrying operations with the technical assistance of military officers.[299]

The inscriptions found at Dokimeion attest the types of people involved in the administration and operations of the quarries. Marks on *pavonazzetto* blocks in Bacakale and in Rome name two procurators, Irenaeus (A.D. 136) and Maro (A.D. 194);

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[297] M. Rostovtzeff, "Geschichte der Staatspacht in Römischer Kaiserzeit bis Diokletian," Philologus Ergäzungsband 9 (1904) 454; O. Hirschfeld Die Kaiserlichen Verwaltungsbeamten bis auf Diokletian (Berlin 1905); C. Dubois, Étude sur l'Administration et l'Exploitation des Carrières Marbres, Porphyre, Granit, etc. dans la Monde Romain (Paris 1908) XXVIII; U. Täckholm, Studien über den Bergbau der Römischen Kaiserzeit (Uppsala 1937).

[298] K. Fitzler, Steinbrüche und Bergwerke im Ptolemäischen und Römischen Aegypten. Ein Beitragzur Antiken Wirtschaftsgeschichte (Leipzig 1910).

[299] O. Hirschfeld, Die Kaiserlichen Verwaltungsbeamten bis auf Diokletian (Berlin 1905) 166.

inscriptions elsewhere name them as *procuratores provincia Phrygiae*. While the responsibilities of the procurators of Phyrgia may have included the supervision of the Dokimeion quarries, the affiliations betweeen the quarries and administrative districts are vague and do not provide secure proof the Dokimeion quarries were included in imperial landholdings.[300] A *dispensator*, who was also a *servus Caesaris*, appears in the epigraphic record at Dokimeion. *Dispensatores* are attested at other imperial quarries as staff members serving under the marble procurators; their responsibilities included making payments to free labor and contractors, as well as supplying food and equipment. Despite the scarcity of evidence for imperial officials at Dokimeion, a *centurio* of the *XXII Primigenia*, Sergius Longus Teullius Saturninus, suggests involvement of the military. Prior to his assignment in the Dokimeion quarries, Saturninus' legion was based at Mogontiacum, the capital city of *Germania Superior*, and appears to have run the Brohltal quarries. Epigraphic evidence from other quarries indicates that Roman centurions were regularly seconded to quarries to support and manage extractive operations. While there is no evidence for an army unit being stationed at Bacakale, Saturninus and his successor, Aelius Antoninus, must have fulfilled duties similar to centurions in other quarries.

The *ex ratione* mark preserves the personal names of either private individuals or members of the *familia Caesaris* and is ocassionally accompanied by the term *redemptor* (contractor); such marks have been interpreted as belonging to contractors of quarry work or lessees of quarry sections, who could also act as intermediaries between the lessees

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[300] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – A.D. 235 (Oxford 2010) 113-114.

and the administrative officials.[301] This reading has recently been challenged, since blocks with the label *ex ratione* are rarely found in the quarries themselves, but in the marble yards of Ostia and Rome. On the purple and white blocks, the *ex ratione* mark appears only one time in the Dokimeion quarries, once in Lepcis Magna, and ten times in Ostia. The bulk of *ex ratione* marks on other types of marbles also appear in Rome. Equally problematic for the original interpretation is the fact some of the same personal names appear on marble blocks from different quarries. Recent interpretations suggest these individuals were not involved in the quarrying process, but rather were contractors of public buildings or of the marble supply who were put in charge of ordering material directly from the imperial quarries.[302] Following this line of thought, it is possible to envision how the quarries produced custom-made items tailored to the needs of individual clients.

The presence of procurators, staff, and military personnel indicate a certain level of imperial involvement, yet private contractors (*caesura* or *caesura*-holders), seem to have been hired for much of the work.[303] They were directly responsible for extraction, and likely operated under a range of agreements. The contractor could have received a fixed payment, for which he was obliged to extract a set number of quarried products, and which would have been paid only when this quota had been met. Alternatively, the *caesura*-holder could have leased a section of a quarry out, and paid rent before the

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[301] O. Hirschfeld, Die Kaiserlichen Verwaltungsbeamten bis auf Diokletian (Berlin 1905) 166; C. Fant, "Rome's Marble Yards," Journal of Roman Archaeology 14 (2001) 167-198.
[302] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – A.D. 235 (Oxford 2010) 323-328.
[303] M. Christol and T. Drew-Bear, "De Lepcis à Aizanoi: Hesperus Procurateur de Phrygie et l'Administration des Carrières de Marbre," J. Desmulliez and C. Hoët-Van Cauwenberghe (eds.), Le Monde Romain à Travers l'Èpigraphie: Méthods et Pratiques (Villeneuve 2005) 189-216.

objects were either channelled into state or private hands. On occasion, the quarry labels reveal the identity of the *caesura*-holders. The centurions mentioned above were also *caesura*-holders in A.D. 136 and 147/148. After this period, however, nearly 20 names with no identifiable social status are named as *caesura*-holders. Both Fant and Hirt believe that these men were private entrepreneurs who came from the local communities of Phyrgia; the name Maryllinus, a *caesura* chief named on three different blocks, has been linked to a leading family at Pisidian Antioch.[304]

The term *officina* is especially important for this study since it has been interpreted as indicating the workshop responsible for refining the roughed out quarry blocks. *Officinae* were often accompanied with toponyms that identified areas of the quarry by name; thus, workshops were were located within the quarrying zone. Moreover, their association with various *bracchia*, which have been interpreted as the topographical reference to the subdivisons within the quarries or the rearrangement of stockpiling areas, suggests that these workshops were mobile units that moved to various areas within the quarry to dress blocks. The combination of *officina* and *caesura* marks, or the appearance of one or the other, seems to signify the procedure of work within the quarries. The omission of either term, which occurs with regularity between A.D. 136 and 154, indicates the independence of the two entities from one another in regard to dressing the blocks. From A.D. 154 onwards, the *caesurae* and *officinae* terms are combined in the same inscription; this has been interpreted as a division in the work in which the *caesura* was responsible for quarrying and the *officina* for dressing the stone.

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[304] C. Fant, Cavum Antrum Phrygiae: The Organization and Operations of the Roman Imperial Marble Quarries in Phrygia. BAR International Series 482 (Oxford 1989) 34-35, n. 217, 220-221.

Officinae bore adjectival names of members of the imperial family, protective deities, or cities. *Officinae Veriana*, *Commodiana*, *Severiana*, *Antoniniana*, and *Alexandriana* may have been formed to deal with specific orders made by the emperor. Likewise, the *officina Ephesia, Neicaensis, Smurnaiorum,* and *Prusaensis* suggest direct links between quarries and civic building projects that employed *pavonazzetto*. The use of the purple and white marble in Ephesus and Smyrna is well-attested; an inscription from Smyrna, for example, records that Hadrian, through Antonius Polemo, gave 72 columns of Dokimeion marble for a gymnasium.[305] An *officina horologium* likely refers to the construction of a horologium. This evidence suggests that *officinae* organized the work according to individual commissions or clients, and that the volume of demand necessitated a high level of organization. The *locus* number also underscores the large demand for stone. Assigned annually as serial numbers, the *locus* numbers record annual production rates; the highest number of blocks produced in one year alone was 433 as stated earlier.

Fant used the results of his epigraphic survey along with the evidence from other inscribing quarries to create a model of distribution around the Mediterranean.[306] He argued that the Roman Emperor monopolized the supply of a select number of prized marbles and that the inscriptions were standardized between quarries in order to convey information between administrative branches. The departure from the normal pattern of distribution - where one would expect a concentration of heavy objects closest to the

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[305] IGR IV, 1431.
[306] C. Fant, "Ideology, Gift and Trade: A Distribution Model for the Roman Imperial Marbles," in W. Harris (ed.), The Inscribed Economy: Production and Distribution in the Roman Empire in the Light of Instrumentum Domesticum (Portsmouth 1993) 145-70.

source - was confirmed to Fant by the near absence of the famed marbles in the cities closest to the quarries. In his view, the totality of the evidence points to the existence of a centralized marble bureau in Rome through which all marble goods first had to pass. While these marbles were available to provincial cities, they had to be purchased through the marble bureau in Rome, and from there, were directed onwards. According to this model, the imperial administration retained exclusive access and control to the production and distribution of state-owned marbles. Fant explained the deployment of expensive marbles in provincial buildings as a product of the redistributive nature of the marble trade; the emperor gave these prestigious marbles to cities as personal gifts.

Fant has retracted his original idea that the scarity of prestige marbles was due to the emperor's preferential access and now believes that select quarries were taken over solely to requisition materials bound for imperial building projects.[307] Independently, Hirt deconstructs the model for centralization by showing that the quarrying labels were never standardized, and that the monolithic administrative entity envisioned by Fant probably did not exist.[308] He believes that the inscriptional evidence from the imperial quarrying ventures indicates that the geographic and geological constraints of individual quarries led to varying organizational hierarchies and a certain level of autonomy, so that major decisions could be decided at the local level rather than at the so-called marble bureau in Rome. On-site personnel decided whether to rely on imperial or military officials to oversee forced or hired labor, or to outsource operations to private companies and individuals.

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[307] Personal communication, Winter 2010.
[308] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – A.D. 235 (Oxford 2010).

In light of Hirt's new interpretation, it is possible to say that the practice of inscribing, at the very least, served a practical function; the codes were essentially part of a tracking system for the administrators to record the shipment of blocks, which helped to prevent expensive blocks from being stolen and sold on the open market and to guarantee their arrival at their intended destination. While the trade in marbles does seem at times to have operated through an imperial system, the state was not the only customer; exporting quarries served the needs of cities and private individuals. Quarry labels found the on revetment slabs of purple and white marble in the Bath-Gymnasium at Sardis and in the Slope Houses at Ephesus, which will be discussed in detail in the next chapter, suggest that both cities and private individuals purchased blocks of Phrygian marble through the imperial system. Even so, I believe the centrality of the marble bureau in Rome to quarrying operations in the provinces has been overstated. Archaeological attestation of the large demand for the purple and white marble in the Dokimeion region suggests that marble was shipped directly to the final destination rather than to Rome and then back to Asia Minor; this explaination allows us to envision a more reasonable and logical process, especially given the difficulties and expense of transporting such a heavy material. Moreover, quarrying activities at Dokimeion were not limited to the *pavonazzetto* outcrops under imperial control; the circulation other varieties of Dokimeion marble as documented in this work in the following chapters suggests that the trade operated through a variety of channels to meet demand for local and regional projects.

Additionally, individuals who were not associated with the imperial family or administration profited from the quarrying industry. The private entrepreneurs, who

acted as *caesura*-holders and came from the local communities of Phrygia, had the potential to earn a substantial income from contracts. Funerary stele depicting the tools used in stone masonry also demonstrate that quarrying activities generated profit for marble workers, or at least enough money to allow them to afford their own tombstones. A doorstone stele depicts a stonemason's hammer; an uninscribed stele shows a bearded man in a chiton and cloak holding a scroll and an adze; a doorstone stele from A.D. 275 depicts a cart laden with marble oxen and drawn by oxen; another stele illustrates a ruler used by stonemasons and the prosopography indicates that the owners were Italian immigrants; another monument found near the quarries at Altintaş shows a ruler, a stone mason's hammer, and yard sticks; a doorstone from nearby Akmonia decorated with stone mason's tools tells us that the person named in the inscription pursued this line of work; an altar from Tiberioupolis relates that the stonemason Euprepes learned his trade from both his mother and his father.[309] That the iconography of quarrying was frequently depicted in the Dokimeion region indicates the importance - and financial benefit - of quarrying to the local inhabitants.

The production of goods

Archaeological and epigraphic evidence both from within the quarries and at a number of sites across the Mediterranean attest the production of sarcophagi, sculpture, and large (monolithic columns) and small scale architectural elements (capitals, bases,

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[309] See, respectively, M. Waelkens, n. 501, 502, 486, 471, 417 Die Kleinasiatischen Türstein. Typologische und Epigraphische Untersuchungen der Kleinasiatischen Grabreliefs mit Scheintür (Mainz 1986); M. Waelkens, "Phrygian Votive and Tombstones as Sources of the Social and Economic Life in Roman Antiquity," Ancient Society 8 (1977) 288; MAMA IX, n. 198a.

revetment) by the Dokimeion workshops. Objects found within the quarries are carved in various states of finish, ranging from a roughed-out quarry-state to a nearly finished-state.

A series of statues on display in the Afyon Museum indicate that statuary was finished to an advanced stage in the quarries. A roughed-out statue, recovered from the Bacakale quarries, and variously identified as either a Hanging Marsyas or a Tyrannicide, was made from the fine grain white marble (Fig. 4.11). Abandoned in the Çakırsaz quarry was a statuette, possibly of a boy, with a columnar support on its back side, made of fine grain white marble (Fig. 4.12). The carvers of an unfinished portrait bust of a woman skillfully exploited a seam in the marble beds so that the bust portion was rendered in purple and white, and the head and hair in white. A statue of a Dacian prisoner made from the purple and white marble was left unfinished near the quarries at Çakırsaz (Fig. 13).[310]

The manufacture of sarcophagi followed a similar trajectory. Four roughed-out sarcophagus lids have been found in the Bacakale quarries, and three of the lids have figures reclining on top of them.[311] These *kline* lids were made to fit on top of a type of a sarcophagus body with columns and arcades that imitated public architecture. H. Wiegartz and Waelkens argued that these Asiatic columnar sarcophagi were made in the Dokimeion workshops for export.[312] The stylistic similarities maintained throughout the

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[310] For account of their discovery, see J. Fant, "New Sculptural and Architectural Finds at Docimium," Araştırma Sonuçları Toplantısı 7 (1989) 111-118; P. Pensabene, "Le Principali Cave di Marmo Bianco," in M. De Nuccio and L. Ungara (eds.), I Marmi Colorati della Roma Imperiale (Marsilo 2002) 206-207; and M. Bruno "Considerazioni sulle Cave, sui Metodi di Estrazione, di Lavorazione e sui Trasporti," in M. De Nuccio and L. Ungara (eds.), I Marmi Colorati della Roma Imperiale (Marsilo 2002) 186-189

[311] C. Fant, "Four Unfinished Sarcophagi Lids at Docimium and the Roman Imperial Quarry System in Phrygia," American Journal of Archaeology 89.4 (1985) 655-662.

[312] H. Wiegartz, Klienasiatische Säulensarkophage. Untersuchungen zum Sarkophagtypus und zu den figürlichen Darstellungen (Berlin 1965); H. Wiegartz, "Marmorhandel, Sarkophagherstellung und die

second and third centuries A.D. of these sumptuously-carved sarcophagi led Waelkens to believe that Dokimeion workshops employed highly specialized sculptors working within a well-established tradition of Asia Minor.[313] The abandonment of the *kline* lids provides independent corroboration for Dokimeion as the production site of columnar sarcophagi, and show that at least the first stages of carving took place within the quarries. In addition to columnar sarcophagi, garland, frieze, and Amazon types were produced at Dokimeion for regional and international distribution.[314] Local production centers in nearly all the regions of Asia Minor made similar types of sarcophagi (Bithynia, Mysia/Troas, Ionia, Caria, Phrygia, Lycia, Pamphylia, Pisidia, Lykaonia/Isauria, Cilicia), but only a select number of production sites, such as Proconnesos, Assos, and Dokimeion reached a larger market.[315] Stylistic uniformity and elaborate decoration suggest that they were exported nearly fully-finished. The finished state of Dokimeion sarcophagi *in situ* stands out in comparison to the exported examples of Proconnesian and Attic sarcophagi, which display various states of finish far more often. Yet even at Dokimeion, this finishing practice may not have been standard. Several sarcophagi in Pamphylia are unfinished; portrait heads on kline lids on the large Istanbul B sarcophagus in the Istanbul Archaeological Museum and on the Afyon K sarcophagus in the Afyon Museum are

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Lokalisierung der Kleinasiatischen Säulensarkophage," in A. Akurgal and B. Alkim (eds.), Mansel'e Armağan/Mélanges Mansel (Ankara 1974); M. Waelkens, Dokimeion. Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage (Berlin 1982).

[313] H. Wiegartz, Mélanges Mansel I, TTKY VII (1960) 376-382; M. Waelkens, Dokimeion. Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage (Berlin 1982); M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 652, n. 87.

[314] M. Waelkens, Dokimeion. Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage (Berlin 1982).

[315] G. Koch and H. Sichtermann, Römische Sarkophage (Munich 1982) 476-557.

blank.[316] The lack of finish on portrait heads was a common practice elsewhere, and has been interpreted as a cost-cutting measure, or as a consequence of carelessness, mass production, or superstitious beliefs.[317] Once a buyer for the sarcophagus had been secured, specialists may have then carved the portrait head. Given the circumscribed, regional distribution of Dokimeion sarcophagi, it is entirely possible that Dokimeion sculptors traveled relatively short distances to finish them. Yet it is also possible that the inland Dokimeion workshops finished the sarcophagi to an advanced stage in order to compete with the sarcophagi produced at lower cost in the exporting coastal quarries.

While the evidence for architectural carving is more limited, it nevertheless displays a similar process of manufacture. Monolithic columns, three bases, and several capitals, including Corinthian and Byzantine basket capitals all show early stages of workmanship.[318] At Dokimeion, 24 of the 238 inscribed blocks catalogued by Fant were column shafts, and 20 were carved as monolithic columns. The columns were nearly fully-finished within the quarries, produced in cylindrical form to specified measurements listed in Table 4.1; columns diameters range between 0.50 to 1.94 m, and in all but one case, the column height cannot be reconstructed. To protect against breakage, the columns could be bundled together for detachment at a later date, and always had protective collars left at the ends of the columns. All but one of the

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[316] H. Wiegartz, "Marmorhandel, Sarkophagherstellung und die Lokalisierung der kleinasiatischen Säulensarkophage," in A. Akurgal and B. Alkim (eds.), Mansel'e Armağan/Mélanges Mansel (Ankara 1974) 381-383; M. Waelkens, Dokimeion. Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage (Berlin 1982) n. 133

[317] J. Huskinson, "Unfinished Portrait Heads on later Roman Sarcophagi: Some New Perspectives," Papers of the British School of Rome 66 (1998) 129-158; R. Smith, "Sarcophagi and Roman Citizenship," in R. Smith and C. Ratté (eds.), Aphrodisias Papers 4 70 (Ann Arbor 2008) 350.

[318] M. Waelkens, P. De Paepe, L. Moens, "Survey in the White Quarries of Anatolia," Araştırma Sonuçları Toplantısı 4 (1986) 114 and C. Fant, "New Sculptural and Architectural Finds from Docimium," Araştırma Sonuçları Toplantısı 7 (1989) 111-118. Several bases located by Fant and Claridge are now missing.

monolithic columns abandoned in the quarries have protective collars, and the length of the surplus material ranges from 0.08 to 0.62 m with an average size of 0.50 m; these measurements indicate that a significant alteration in size did not take place after they left the quarries (Figs. 4.10 & 4.14).[319] Partial finishing for all types of marble objects may have in fact been the norm.

Two-thirds (156 out of 237) of the inscribed blocks abandoned in the quarries were cut with stepped surfaces on one or two sides, and were intended to be wall revetment (Fig. 4.15). The proportion of veneer blocks abandoned in the quarries reflects that this item was surely the most widely traded Dokimeion item on the market. The blocks were probably cut in this manner to expose the visual properties of the stone and ensure their suitability for decorative wall revetment before they were sawn into slabs. The markings of a saw over eight meters in length on a quarry face at Dokimeion indicate that the sawing of stones took place within the quarries.[320] Water-powered stone saw-mills discovered *in situ* in Jerash and Ephesus, and a depiction of a stone saw in action on a sarcophagus relief at Hierapolis indicate that sawing could also took place in urban quarters.[321] Because thin slabs of wall revetment were prone to breakage, revetment at Dokimeion was probably shipped as blocks and cut into slabs closer to their final place of installation.

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[319] This figure is based on the series of monolithic columns abandoned in the *cipollino* quarries at Kylindri. M. Wilson-Jones, Principles of Roman Architecture (New Haven 2000) 132.
[320] J. Röder, "Marmor Phrygium. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 303-311; M. Bruno, "Considerazioni sulle Cave, sui Metodi di Estrazione, di Lavorazione e sui Transporti," in M. Nuccio and L. Ungaro (eds.), I Marmi Colorati della Roma imperiale (2002) 188-189.
[321] T. Ritti, K. Grewe, and P. Kessener, "A Relief of a Water-Powered Stone Saw Mill on a Sarcophagus at Hierapolis and its Implications," Journal of Roman Archaeology 20 (2007) 138-164.

Perhaps the Dokimeion workshops produced half- or nearly fully-finished items for export. Removing the excess material within the quarries had many benefits: internal flaws hidden in the marble were revealed, the weight of the item was diminished for transport, and the value of the object was increased. This was an economic measure developed to offset the high costs of transportation. Given that these remote, inland quarries had to compete with others more ideally located for export, the workshops may have made a conscious decision to specialize in the production of monolithic columns and columnar sarcophagi. Yet the evidence admittedly remains tenuous; Dokimeion artisans could have traveled to the site, or local artisans may have added the final details after they had received the roughed out marble products.

Because of a strong possibility that a fully-finished object could be damaged en-route, Ward-Perkins favored the idea that the finishing touches on an object were added at final destination either by sculptors who traveled with their materials, or by local craftsmen.[322] The shipment of nearly-finished items was central to his idea in which production reached an extremely sophisticated, quasi-'capitalist' level of manufacture; and he cited Dokimeion products as examples of this phenomenon. The prefabrication of objects within the quarries, the standardization of sizes of columns and blocks, and the stockpiling of materials for future use were evidence for a major overhaul in the customer-supplier relationship. No longer did the architect, builder, or client go directly

[322] H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 37.

to the quarries. Instead they dealt with the growing demand for materials by pre-ordering supplies that were mass-produced.[323]

Case study: Monolithic columns and architectural design. In order to test Ward-Perkins' theory of the standardization of sizes, I have made a study of the production of the purple and white monolithic columns. Acknowledging that the evidence for standardization of column lengths was unclear, Ward-Perkins believed that more work on column measurements of different dates from different quarries was needed before questions of standardization and prefabrication could be answered definitively.[324] As described above, both literary sources and shafts abandoned within the quarries testify to the importance of the manufacture of monolithic columns at Dokimeion. Colored Phrygian marbles are well-attested in major architectural projects both in Rome and throughout the Mediterranean, and the material is easily, and securely, identifiable.

Monolithic columns were a hallmark of Roman construction. Roman builders eschewed the Greek tradition of creating columns out of stacked drums of white marble, and instead preferred imported, colored columns hewn from single blocks of stone. The Roman preference for columns, shafts, capitals, and bases of contrasting colors meant that orders were sent to various quarries across the Empire. The different colored column shafts and bases ordered from different quarries would have arrived in different shipments.

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[323] H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 25.
[324] H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 25, n. 18.

In his Principles of Roman Architecture, M. Wilson-Jones argues for the existence of a widely-used set of normative design proportions. His quantitative analysis of select Roman monuments from around the Empire led him to believe that architects and craftsmen relied upon a standardized metrology and simple geometric and arithmetic values for building design as described in general terms by Vitruvius. For example, the height of a Corinthian column played a pivotal role in determining the proportions of a building.[325] The ratio of the full column height (base, shaft, and capital) to that of its column shaft should be 6:5, and column shafts were often produced in multiples of five and ten Roman feet.[326] Lengths were not restricted to these sizes alone, but could also be produced in a.) multiples of four RF, b.) any other whole numbers up to 20 RF, or c.) none of these.[327] Monolithic columns generally had a ratio of slenderness (height to diameter) of 8:1. This ratio was endorsed by Roman surveyor's formulas recorded in a medieval codex in Munich, in which one formula makes the column's height two and a half times the lower circumference, and another stipulates that the width of the column and astragal should be 1/7th and 1/8th the column shaft.[328] With these two principles of design in mind, it is possible to ask if craftsmen working in the Dokimeion quarries adhered to these rules standard in the production of monolithic columns.

Table 4.1 is a partial listing of the findspots of monolithic columns, and presents column-shafts with known height and diameter measurements in both meters and the Roman feet.[329] Measurements were drawn mainly from detailed architectural studies on

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[325] M. Wilson-Jones, Principles of Roman Architecture (New Haven 2000) 125-126.
[326] M. Wilson-Jones, Principles of Roman Architecture (New Haven 2000) 147-148.
[327] M. Wilson-Jones, Principles of Roman Architecture (New Haven 2000) 155.
[328] M. Wilson-Jones, Principles of Roman Architecture (New Haven 2000) 148, n. 45.
[329] The Roman foot was approximately 2.96 m.

individual buildings; references are included in the table. Many more instances are excluded because of the poor state of preservation, uncertain provenance assignment, or the lack of or hypothetical reconstruction of measurements.

The heights of the column shafts can be categorized as 1 7RF, 1 8RF, 5 10 RF, 4 12RF, 2 14RF, 4 15RF, 1 17 RF, 5 20RF, 1 21RF, and 2 26RF. Thus, we see that 14 out of 26 were produced in multiples of five, nine in multiples of four, and 23 in whole numbers up to 20. That nearly half of the columns measure ten, 15, and 20 RF indicates a preference for production in multiples of five RF. On the whole, however, there is little consistency between columns sizes.

In regard to the ratio of slenderness, five of the 25 examples fall within a 9:1 ratio, ten in a 8:1 ratio, 10 in a 7:1 ratio, and 2 in a 6:1 ratio. For monolithic columns abandoned in the Proconnesos quarries, Asgarı found that the distribution of proportion of height to diameter for monolithic columns broke down similarly (2 8:1, 1 7:1, and 3 6:1).[330] At Dokimeion, nearly half of the columns were produced at an 8:1 ratio. Using the second Roman surveyors' formula of 8:1 and 7:1, the number rises to 20 out of 25, or 80 per cent.

To summarize: the degree of conformity to the 8:1 or 7:1 ratio indicates that the Roman stone masons in the quarries adhered to this mathematical principle as a guideline for producing monolithic columns. The case for standardization of column height is, however, less straightforward, especially since they were not produced in rounded numbers. It is likely that the shaft height mattered less because any discrepancies were

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[330] N. Asgarı, ""Observations on two types of quarry items from Proconnesus: Column-shafts and column-bases," in M. Schvoerer (ed.), ASMOSIA IV (Leuven 1992) 73-74.

rectified by adjusting the heights of the column pedestals and capitals to achieve the appropriate proportions for a building. The measurements presented in this limited case study do seem to indicate that there were very basic and flexible rules for column manufacture. More examples of both Dokimeion and other types of monolithic columns are needed, however, before it will be possible to say whether column-making was geared towards individual commission or towards large-scale prefabrication and stockpiling.

Distribution of Dokimeion marbles

The reasons for Dokimeion's development into an international marble exporting center are important to consider. Abundant and locally-available sources of marble, the presence of urban settlements, natural communication routes, such as roads and waterways, and a surplus of wealth are all favorable conditions for the birth of a marble-carving workshop.[331]

The urbanization of the Anatolian interior during the Julio-Claudian period transformed the region into an important frontier of the Roman Empire, but its rural character was never fundamentally altered. Many agricultural townships in Phrygia acquired city-status, new cities in neighboring provinces were founded as veteran colonies, and Phrygian locals, Italian *negotiatores*, Italian senatorial families, and imperial procurators were among the wealthy landowners who owned and operated

[331] M. Waelkens, "Carrières de marbre en Phrygie," Bulletin des Musees Royaux d'Art et d'Histoire (Brussells 1982) 42.

Phrygia's agricultural estates.[332] The *Via Sebaste* was built in 6 B.C. under Augustan administration, which ran through Pamphylia, Phrygia, and Cilicia, and linked Central Anatolia to the Aegean and southern Mediterranean coasts. While this road system was primarily part of imperialist plans for military intervention and colonization in the interior, a similar road system in Spain built at the same time, offers a glimpse into the underlying commercial interest of imperialism.[333] The construction of a branch from the Spanish *Via Sebaste* to Sierra Morena, rich in lead, copper and silver deposits, and mined by Roman imperial officials, bears striking resemblance to the branch from leading Apameia to the marble quarries at Dokimeion.[334] Archaeological evidence also implicates the Augustan imperial administration in launching the marble industry. The earliest surviving use of *pavonazzetto* was used in the paving of the Temple of Mars Ultor, dedicated in 2 B.C., but by the time of Augustus' death, the marble adorned nearly every imperial building in Rome.[335] In the marble-poor regions of Pisidia, some of the earliest examples of marble statuary in civic monuments were crafted out of white Dokimeion marble, and are datable to the reign of Augustus.[336]

Epigraphic evidence and the distribution of Dokimeion goods indicate that the marble could have been transported along several routes, none of which have been proven definitively. It could have been moved from Dokimeion to Synnada to Apameia,

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[332] S. Mitchell, Anatolia: Land, Men, and Gods in Asia Minor (Oxford 1993) 80-90, 158-161; B. Levick, Roman Colonies in Southern Asia Minor (Oxford 1967).
[333] B. Levick, Roman Colonies in Southern Asia Minor (1967) 41.
[334] CIL $II^2/7$, 981.
[335] C. Fant, Cavum Antrum Phrygiae: The Organization and Operations of the Roman Imperial Marble Quarries in Phrygia. BAR International Series 482 (1989) 7.
[336] D. Robinson, "Roman sculptures from Colonia Caesarea (Pisidian Antioch)," Art Bulletin 9 (1926) fig. 116; L. Moens, P. De Paepe, and M. Waelkens, "An Archaeometric Study of the Provenance of White Marble Sculptures from an Augustan Heroon and a Middle Antonine Nymphaeum at Sagalassos (Southwest Turkey)," M. Waelkens and J. Poblome (eds.), Sagalassos IV. Report on the Survey and Excavation Campaigns of 1994 (1997).

and then along an overland route through the Maeander river valley before reaching Ephesus where it could have been shipped out to the wider Mediterranean.[337] The prevalence of Dokimeion marble in Pisidia and Pamphylia cities led Waelkens to believe that a second, shorter route (200 km to the Mediterranean sea as opposed to 300 km to the Aegean sea) cut through the mountainous Pisidian region along the *Via Sebaste,* and down to a coastal port near Perge in Pamphylia.[338] Ward-Perkins thought that a third outlet for the seaborne material went through Nicomedia to the Black sea.[339]

While the epigraphic record points to a degree of imperial intervention in the quarries, archaeological evidence shows that the movement of goods - beyond imperial requisitioning - could be channeled into local, regional, and international markets, and that the Roman state did not monopolize all the extracted material from Dokimeion. A comprehensive study of the distribution of Phrygian marbles has never been undertaken, but a cursory glance at the ASMOSIA series volumes showed that the *pavonazzetto* and white marbles of Dokimeion reached nearly every province of the Roman Empire. The marbles were employed extensively throughout Italia, Rome, Hispania, Gallia, Britannia, Germania, Dacia, Moesia, Asia, Syria, Judaea, Creta, Cyrenaica, and Africa most commonly for columns, sarcophagi, statuary, and revetment.

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[337] M. Christol and T. Drew-Bear, "De Lepcis Magna à Aizanoi: Hesperus Procurateur de Phrygie et l'Administration des Carrières de Marbre," in J. Desmulliez and C. Hoet-Van Cauwenberghe (eds.), Le Monde Romain à Travers l'Épigraphie*:* Méthodes et Pratiques (Villeneuve 2005) 199, n. 35.
[338] M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 370-374.
[339] H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 67.

Columnar sarcophagi believed to be made in the Dokimeion workshops reached Rome, Italy, Moesia Inferior, Syria, Palestine, and Arabia.[340] Waelkens and Fant both believed that the sarcophagi joined the cargo of architectural elements and blocks of veneer to Rome, and that this is indicative of state control over sarcophagus production.[341] While an infrastructure put in place by the state facilitated the movement of materials, it should be noted that none of the typical marks of imperial control were inscribed on the sarcophagi; moreover, the exportation of other types of sarcophagi around the Mediterranean was far greater than that of Asiatic sarcophagi. Consumption of Dokimeion sarcophagi was for the most part a local or regional affair; Waelken's catalogue lists nearly 50 different cities and villages in Asia Minor whose inhabitants owned a Dokimeion-style columnar sarcophagus.[342] In comparison, the 19 per cent of sarcophagi shipped outside of Asia Minor reached only 13 different cites.

Waelkens has suggested that in the later second century A.D., the quarries were leased out to private contractors, and thereafter, the marble was extracted primarily for local use. In fact, Dokimeion marbles were being used locally from the Augustan period onwards. The following section, based on the data from various studies, shows that Dokimeion marbles were used far more extensively than has previously been recognized. Purple and white monolithic columns from Dokimeion adorned the so-called imperial

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[340] H. Wiegartz, Klienasiatische Säulensarkophage. Untersuchungen zum Sarkophagtypus und zu den figürlichen Darstellungen (Berlin 1965); H. Wiegartz, "Marmorhandel, Sarkophagherstellung und die Lokalisierung der kleinasiatischen Säulensarkophage," in A. Akurgal and B. Alkim (eds.), Mansel'e Armağan/Mélanges Mansel (Ankara 1974); M. Waelkens, Dokimeion. Die Werkstatt der repräsentativen kleinasiatischen Sarkophage (Berlin 1982).

[341] M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 651; Fant develops this further in "Four Unfinished Sarcophagi Lids at Docimium and the Roman Imperial Quarry System in Phrygia," American Journal of Archaeology 89.4 (1985) 655-662.

[342] M. Waelkens, Dokimeion: Die Werkstatt der Repräsentativen Kleinasiatischen Sarkophage. Chronologie und Typologie Ihrer Produktion (Berlin 1982) 68-103.

cult room within the Vedius Baths, the Harbor Baths, the Library of Celsus, the Hestiatorion, the Laecanius Bassus Nymphaeum, and the Slope Houses at Ephesus,[343] and appeared in the *scaenae frons* of the theaters at Hierapolis[344] and Patara,[345] in the Bath Gymnasia at Sardis[346] and Smyrna,[347] and in the colonnaded streets and the library in Side.[348]

Scientific studies identify Dokimeion marble as the source for the statuary and architecture of the major public monuments within the marble-poor regions of Phrygia and Pamphylia. These regions relied on limestone available in the vicinity, and imported enormous quantities of marble; for example, 39 marble statues filled the niches in the Gate of Magna Plancia in Perge. While the exportation of the distinctive-looking Proconnesian marble to the region has long been recognized,[349] Dokimeion white marble seems to have played a larger role than previously assumed. White marble from Dokimeion was the source for a capital in the Bath-house in Cremna in Pisidia, an Apollo from the North Nymphaeum, and Corinthian pilasters in the Baths and Severan Nymphaeum in Perge; a combination of isotopic, macroscopic, and art historical analysis makes the assignment fairly secure.[350] Signatures of Dokimeion sculptors on free-

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[343] B. Burrell, "Phrygian for Phrygians: Semiotics of 'Exotic' Local Marble," ASMOSIA IX Conference (Tarragona 2009).
[344] P. Pensabene, "Gli Elementi Marmorei della Scena," in D. De Bernardi Ferrero, G. Ciotta, and P. Pensabene, Il Teatro di Hierapolis di Frigia (Genova 2007).
[345] K. Piesker, personal communication.
[346] H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 67, footnote 27.
[347] IGR IV, 1431.
[348] A. Mansel, Die Ruinen von Side (Berlin 1963).
[349] For a partial listing in Pamphylia, see S. Mitchell, Cremna in Pisidia (London 1995) 83-84.
[350] J. Herrmann and R. Tykot, "Some products from the Dokimeion quarries: Craters, tables, capitals, and statues," in Y. Maniatis (ed.), ASMOSIA VII (Athens 2009) 59-75.

standing statuary, which will be described in detail below, verify that the Dokimeion sculptural workshops helped to embellish cities with marble decoration.

Scientific analysis on the Ludovisi "Barbarian" statuary group suggests that three of the statues (Dying Gaul, head of a Persian, and head of a Greek) were made from Dokimeion marble; the Amazon killing a barbarian was made from Carraran marble.[351] These results are more probable because they were obtained using the full range of provenancing techniques and because Dokimeion and Carraran marble are chemically distinguishable from one another. This group of sculptures, which was discovered during the construction of the Villa Ludovisi in the 1620's may have come from the Roman Horti Sallustiani; they are often thought to be copies of original bronze statues set up in Pergamon in 220 B.C.[352]

In addition, the Dokimeion quarries produced a type of funerary stele in white marble called *Türstein* from the early second to the late third centuries A.D. for local consumption (Fig. 4.16). The *Türsteine* represented false doors and could be decorated with figures, solar symbols, or funerary offerings. As elements of a distinct, indigenous, tradition unique to Phrygia and eastern Galatia, they were produced for local farmers, quarrymen, and locals abroad, such as soldiers in Dalmatia.[353] The varying iconographic schemes indicate that the client selected the decorations on an individual basis.

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[351] D. Attanasio, M. Bruno, and W. Prochaska, "The Docimium Marble of the Ludovisi and Capitoline Gauls and Other Replicas of the Pergamene Dedications" American Journal of Archaeology 115.4 (2011) 575-587.
[352] F. Coarelli, Da Pergamo a Roma (Rome and Perugia 1995) 10-48; M. Marvin, "The Ludovisi Barbarians: The Grand Manner," E. Gazda (ed.) The Ancient Art of Emulation (Ann Arbor 2002).
[353] M. Waelkens, Die Kleinasiatischen Türstein. Typologische und Epigraphische Untersuchungen der Kleinasiatischen Grabreliefs mit Scheintür (Mainz 1986).

The other, lesser-known colored marbles from Dokimeion also achieved a regional distribution. The blue and white *kaplan postu* marble was used for revetment in the Wadi B temple at Sardis,[354] and for monolithic columns along the *Embolos* in Ephesus.[355] It was used extensively at Sagalassos for monolithic columns in the *Macellum*, Bath-Complex, and Upper and Lower Agoras.[356] The yellow and white *Afyon bal* breccia was used throughout the Bath-Complex at Sagalassos[357] and for monolithic columns in the *Embolos* and State Agora at Ephesus.[358] That trade occurred in the lesser-known marbles is not unexpected. Quarrymen already possessed the technical knowledge for crafting enormous columns out of single piece of stone, and the infrastructure for transportation existed for the more popular types of traded marbles.

The signatures of Dokimeion artisans

While the archaeological record confirms that Dokimeion workshops or itinerant Dokimeion craftsmen carried out imperial commissions, the epigraphic record shows they also traveled extensively throughout Asia Minor to carry out commissions.[359] Dokimeion artisans signed their names to funerary stele, sarcophagi, and freestanding

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[354] C. Greenwalt, "Sardis: Archaeological Research and Conservation Projects in 2005," Kazı Sonuçları Toplantısı 28.2 (2006) 744.
[355] My own observation.
[356] See, respectively, http://www.sagalassos.be/en/node/1822; http://www.sagalassos.be/en/node/886; P. Degryse et al, "The Sagalassos Quarry Landscape: Bringing Quarries in Context," Quarry Scapes Project: Ancient Stone Quarry Landscapes in the Eastern Mediterranean (2007) 21.
[357] http://www.sagalassos.be/en/node/886.
[358] My own observation.
[359] For partial lists of Dokimeion signatures, see L. Robert, "Les Kordakia de Nicée, le Combustible de Synnada et les Poissons-Scies. Sur des Lettres d'un Métropolite de Phrygie au Xe Siècle. Philologie et Réalités II," Journal des Savants (1962) 42-43, n. 12-16; L. Robert, A Travers l'Asie Mineure (1980) 227, n. 45-47, 49, 51, and 54; J. Ward-Perkins "Nicomedia and the Marble Trade," Papers of the British School at Rome 48 (1980) 35-36; A. Hall and Waelkens, "Two Dokimeion Sculptors in Iconium," Anatolian Studies (1982) 151-155.

sculpture in a number of the regional cities of Cilicia, Pamphylia, Lyconia, Pisidia, and Phyrgia. They identify themselves and their associations with the Dokimeion workshops with the standard phrase of "Glykon, son of Alkimos, from Dokimeion made this work."[360]

The inscriptions also allude to the structure of marble-carving workshops. In a limestone dedicatory plaque, two brothers, Limnaios and Diomedes identify themselves as "carvers of statues (ἀγαλματογλύφοι)".[361] The corpus of inscriptions from manufacturing industries, such as brick stamp, bronze-casting, pottery and textile workshops, have shown that the family-unit was the basis for artisanal businesses of the ancient world, and that knowledge - and talent - was handed down from one generation to the next.[362] While Limnaios and Diomedes say that they were carvers of statues, Auxanon calls himself a stone mason (λιθουργός)[363] and an Aurelius Athenodotus, a Dokimeion craftsman (Δοκιμεὺις τεχνίτης).[364] This labeling speaks to a level of specialization within the quarries and associated workshops at Dokimeion.[365] Given the range and volume of items produced at Dokimeion, it is possible to envision a division of

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[360] M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 371-372.
[361] W. Calder, MAMA VIII (1962) 39.
[362] A selection of studies includes: J. Marcadé, Recuil des Signatures de Sculpteurs Grecs II (Paris 1957); T. Helen, Organization of Roman Brick Production in the First and Second Centuries A.D.: An Interpretation of Roman Brick Stamps (Helsinki 1975); A. Stewart, Attika. Studies in Athenian Sculpture of the Hellenistic Age (London 1979); K. Arafat and C. Morgan, "Pots and Potters in Athens and Corinth," Oxford Journal of Archaeology 8 (1989) 311-346; V. Goodlett, "Rhodian sculptural workshops," American Journal of Archaeology 95 (1991) 671-672; G. Fülle, "The Internal Organization of the Arretine Terra Sigilata Industry. Problems of Evidence and Interpretation," Journal of Roman Studies (1997) 111-155; B. Ridgway, Hellenistic Sculpture II (Madison 2000); B. Ridgway, Hellenistic Sculpture II (Madison 2002).
[363] See A. Hall and M. Waelkens, "Two Dokimeion Sculptures in Iconium," Anatolian Studies 32 (1982) 153, n. 16 and 17.
[364] SEG XV 796; W. Calder, "Early-Christian Epitaphs from Phrygia," Anatolian Studies 5 (1955) 31-33, pl. 1.
[365] A. Hall and M. Waelkens, "Two Dokimeion Sculptures in Iconium," Anatolian Studies 32 (1982) 151-155.

labor between the quarrymen, and the carvers who crafted architectural pieces, sarcophagi and sculpture. The most experienced master-craftsmen may have been responsible for carving bodies, drapery, and portrait heads. The lack of finish on the portrait heads on many Dokimeion columnar sarcophagi may be one more indication of the operations of a highly specialized workshop.

At least a half dozen statues with the signatures of Dokimeion artists have been found in the urban buildings of marble-poor cities of central and southern Anatolia. A base for a male statue and statue of Asclepius on the Antonine Nymphaeum at Sagalassos were both signed by Glykon from Dokimeion.[366] In the Sanctuary of the Imperial Cult at Pisidian Antioch, a colossal statue of a seated Zeus bears the signature of a "Meanandros from Dokimeion."[367] In Aspendos, "Moschos, son of Moschos, also named Kallippos, from Dokimeion" signed the mantle of a female statue.[368] In the region of Bursa, an inscription tells us that "Neikostratos, son of Rufus, dedicated a statue of Zeus to Zeus," and that "Neikostratos' son brought it from Dokimeion."[369]

Signatures of Dokimeion marble-workers are also found on six sarcophagi from within the Hierapolis necropoleis.[370] These sarcophagi are prominently displayed on massive platforms, and stand out amongst the locally-produced sarcophagi, which on

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[366] M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, and P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 371-373.
[367] D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," Art Bulletin 9 (1926) fig. 116; M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 652.
[368] L. Robert, "Les Kordakia de Nicée, le Combustible de Synnada et les Poissons-Scies. Sur des Lettres d'un Métropolite de Phrygie au Xe Siècle. Philologie et Réalités II," Journal des Savants (1962) 41-42.
[369] L. Robert, "Les Kordakia de Nicée, le Combustible de Synnada et les Poissons-Scies. Sur des Lettres d'un Métropolite de Phrygie au Xe Siècle. Philologie et Réalités II," Journal des Savants (1962) 42.
[370] W. Judeich, Altertümer von Hierapolis. Jahrbuch des Deutschen Archäologischen Instituts Ergänzungsheft 4 (Berlin 1898) n. 56, 158, 209, 213, 323, and 335.

occasion name the local marble as coming from Thiunta.[371] The unusually well-preserved Hierapolis necropoleis present a picture of social class and status. The travertine sarcophagi constituted the bulk of the sarcophagi in the largest necropolis (north-west) of Hierapolis. The owners of the Dokimeion sarcophagi represented a wealthier segment of society as is evident from the fact that the Dokimeion sarcophagi had to be transported overland at great cost and distance in contrast to the locally-produced sarcophagi where the costs of transport would have been much lower.[372] Moreover, it was rare for craftsmen to sign their names on sarcophagi; the signatures and archaeological context indicate that these sarcophagi must have warranted special mention.

Signatures on the locally-distributed funerary *Türsteine* are indicative of more modest commissions. Within the village of Dokimeion, Menander from Dokimeion signed a third to fourth century A.D. stele portraying a local family and at Cotiaeion, Aurelius Athenodotus of Dokimeion signed his name to a fourth century A.D. stele.[373] Other sculptors active in the Altıntaş workshops signed a type of door stele with a triangular gable above a rectangular representation of a door.[374] Teimeas of Mourmate,

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[371] W. Judeich, Altertümer von Hierapolis. Jahrbuch des Deutschen Archäologischen Instituts Ergänzungsheft 4 (Berlin 1898) n. 113, 178, 312, 339b.
[372] H. Vanhaverbeke and M. Waelkens, "The Chronological and Topographical Distribution of the Travertine Sarcophagi and their Way of Production," in D. Ferrero (ed.), Saggi in onore di Paolo Verzone (Rome 2002) 119-145.
[373] SEG XV 800; W. Calder, "Early-Christian Epitaphs from Phrygia," Anatolian Studies 5 (1955) 35-36.
[374] M. Waelkens in Die Kleinasiatischen Türstein. Typologische und Epigraphische Untersuchungen der Kleinasiatischen Grabreliefs mit Scheintür (Mainz 1986) called this stele, Type C.

his son Zelas, Alexander, and Epitynchanos signed their names, but did not include their ethnic origin.[375]

As already discussed in chapter two, the artisanal practice of signing was not unique to Dokimeion; signatures of Proconnesian, Nicomedian, and Aphrodisian marble-workers have also been found, and largely in the west.[376] Signatures were far from common, and we do not know why some artists signed their works and others did not. Because the preserved names are overwhelmingly Greek in origin, scholars have argued that the Romans were in debt to artisans from the Greek-speaking world, and that Greek sculptors helped to build the major architectural and sculptural masterpieces of the Roman world.[377] An artists' signature has been interpreted as statement of geographic origins that served as a kind of quality mark for those working in the western part of the Empire. Yet a closer examination of the corpus of signatures shows that Dokimeion marble-workers, in particular, tended to sign works that they produced closer to home. The geographic diffusion of signatures thus sheds light on two converging issues. First, artisans affixed their names to works intended for export, and as such, they still represented a quality assurance earned by the consistent creation of high-quality craft goods from a major marble production center. However, signatures were not exclusively reserved for the most prestigious commissions; they are found both on large-scale public monuments and on very modest, private commissions. The evidence from Dokimeion suggests that artisans continued to sign because they were trained in Hellenic traditions

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[375] See Waelkens, Die Kleinasiatischen Türstein. Typologische und epigraphische Untersuchungen der kleinasiatischen Grabreliefs mit Scheintür (Mainz 1986) 90-91, 97 n. 228,
[376] J. Toynbee, "Some Notes on Artists in the Roman World II: Sculptors," Collection Latomus 9 (1950) 49-65; J. Ward-Perkins "Nicomedia and the Marble Trade," Papers of the British School at Rome 48 (1980) 32-36.
[377] P. Stewart, The Social History of Roman Art (Cambridge 2008) 11-18.

and that they chose to give their work value in an expression of cultural and artistic identity that remained fundamentally Hellenic. Sculptors who signed while working away from their homes represents an extension of this habit. Second, an analysis of the mobility of materials and artists from Asia Minor allows us to envision the dynamics of circulation in local and regional networks. The pattern of circumscribed mobility implies that the marble was widely used in the region, and that Dokimeion artisans as those in Aphrodisias were consumed with producing marble for a local market.

CONCLUSION

In conclusion, the Roman state took advantage of Phrygia's abundant marble resources and opened the quarries to monumentalize the imperial capital of Rome. By pouring money into the quarries for the initial purpose of adorning imperial building projects, the purple and white marble became widely-recognizable, fashionable, and a status-symbol not only for the emperor, but for cities and wealthy aristocrats across the Empire. Workshops based in the quarries produced high-quality monolithic columns, statuary, and funerary monuments in both *pavonazzetto* and the fine grained white marbles. To overcome a logistically difficult location and to offset the high costs of transportation, goods may have been finished to an advanced degree before shipment, and since Dokimeion products were prized both for their craftsmanship and uniqueness, they achieved a wide distribution. The association with the emperor, a well-funded state infrastructure, and a skilled workforce allowed the Dokimeion quarries to develop into a marble exporting center and to meet the demand for sculpted marble. The

monumentalization of regional cities in Asia Minor from the early first century A.D. to the third century A.D. may have in large part driven these markets; the pattern reflects that the marble was much cheaper when shipped locally. Signatures of craftsmen indicate that the Dokimeion workshops were largely engaged with commissions for local cities and individuals. These artisans, acting as independent agents, profited from their association with the imperial quarrying machine, which continued to export the famous Dokimeion marbles to the rest of the Roman Empire.

CHAPTER 5

EPHESUS AND SARDIS:
MARBLE RICH CITIES AS SUPPLIERS AND CONSUMERS

> Please do as you say about the statues and the Hermeraclae: and have them shipped as soon as you can conveniently, and any other things you come across that are suitable for the place – you know what it is like – especially for the Palaestra and the Gymnasium. That's where I am sitting and writing now so my thoughts naturally run on it. I give you a commission too for bas-reliefs for insertion in the stucco walls of the hall, and for two well-covers in carved relief.[378]

Cicero's vision for decorating his gymnasium with imported objects reflects the early stages of a trading network that would grow and develop in Rome and spread to cities across the empire. The example of Cicero, writing to Atticus in Athens, reveals the personal relationships between clients and their suppliers, and gives us the details that the archaeological record cannot. In chapter two, I described the model that scholars have favored, which distinguishes between the use of stone for prestigious official projects, backed up by the wealth and organization of the Roman emperor, and the exploitation of local geological reserves used for ordinary, local building.[379] As shown in this passage and as argued in the preceding chapters on Aphrodisias and Dokimeion, these distinctions

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[378] Cicero, Letters to Atticus 1.10.3 (trans. E. Winstedt).
[379] K. Greene, The Archaeology of the Roman Economy (Berkeley 1986) 149-150.

are in fact more complicated and are influenced by a number of factors. By continuing the survey of marble exploitation, distribution and consumption patterns in Asia Minor with the cases of Ephesus and Sardis, two marble-rich cities with long-standing marble carving traditions of their own, it is possible to come closer to answering the questions posed at the outset of the dissertation. Did cities use their marble resources to benefit from the prestige brought about by civic beautification or from the profits made from trade? Did marble-rich cities maintain self-sufficient building-material economies or did they integrate themselves into regional or empire-wide marble trading networks, either as suppliers or consumers? These are all questions of degree, and as such, it is important to ask if the evidence signifies exchange as incidental or as the main purpose of commerce. To begin the chapter, I examine Ephesus and Sardis in their local geographic and historical contexts, and then proceed to examine patterns of marble exploitation and consumption by linking quarry sites to their urban cores and material acquisition to local artisanal production, providing a survey of the importation of high prestige stones used in civic adornment.

EPHESUS

Austrian-led excavations, operating almost continually since 1863, have generated a great deal of information on the use of building materials. Their excavations have uncovered a large portion of the Greco-Roman marble monuments of the city, and the focus on architectural history and anastylosis has resulted in detailed studies of the original structures. The sculptural typologies and contexts are well-studied, and the

results of isotopic and petrographic analyses have been published or are forthcoming. The documentation of imported marbles has been the subject of several projects. Although no single study exists on the known quarries, individual quarry sites have been documented in some detail; in light of the fact that a systematic archaeological survey has not been conducted in the region, it is probable that a number of quarries remain unrecorded. Recently, identification and chemical analyses of Ephesian marbles have been carried out by a team of geochemists. Drawing together these various strands of information, Ephesus' abundance of marble resources, its long-standing marble-carving traditions, its position as center of trade, religion, and provincial administration made it a center for marble-working and the international marble trade in the Roman period. Ephesus' unique historical, geographical, and geological circumstances make it of fundamental importance to any study on Asia Minor's marble quarrying industries.

Geography, History, and Geology

Ephesus was a leading city of Asia Minor from the Iron Age to Late Roman periods, and its social, economic, and political prominence was due in part to its strategic location. Situated near the mouth of the Cayster river on the Aegean sea, the city developed around a natural harbor and lay at the end of a major east-west land trading route that gave access to the Anatolian interior and the Near East (Fig. 5.1). Continually occupied since the sixth millenium, it was regularly subject to the expansionist ambitions of foreigners from the Ionian period onwards. The influx of Greek settlers to Ephesus led to its incorporation into the Ionian League; the Lydian king, Croesos, absorbed the city into his kingdom and paid homage to an already ancient cult of Artemis by funding a marble

temple in her name; Ephesians helped to instigate the Persian wars in their attempt to throw off the yoke of Persian rule as participants in the Ionian revolt in 499 B.C.; the Hellenistic general, Lysimachos, forcibly relocated the inhabitants from nearby Ionian cities around 300 B.C.; and the city was re-conquered for the Seleucids under the King Antiochus III in 195 B.C. As Roman military pressure grew increasingly stronger, the region was annexed to the Pergamene kingdom and the city eventually fell under Roman control when the Pergamene king Attalos III willed his kingdom to the Roman people in 133 B.C. During the tumultuous Republican civil wars, Ephesus found itself caught in the middle of the political intrigues of Roman generals and it was not until the accession of Augustus, who designated Ephesus the capital of Asia, that peace returned.

Marble architecture was introduced in the Archaic period with the construction of a collosal marble temple of Artemis, later enlarged in the late Classical period. Ephesus underwent extensive urban transformation in the Hellenistic and Roman periods. From the third century B.C., Ephesos was fitted with the urban infrastructure of a Hellenistic town; the known Hellenistic monuments included temples, defensive fortifications, agoras, honorific monuments for various civic notables, a running track, and a theater. During Roman times, the city was extended to the west and northwest between the slopes of Bülbüdağ and Panayırdağ. As the Roman Proconsul's headquarters and a center of trade and religion, its diverse population comprised administrative bureaucrats, religious administrators, foreign immigrants, local notables and countryside dwellers. Of the enormous capital at its disposal, Aelius Aristides said, "nobody can contradict it when Ephesus is called the 'Bank of Asia' and is recognized as the refuge for all financial

liens."[380] By its heyday in the second century A.D., the urban landscape included agoras, open air altars, high-end residential apartments, aqueducts, arches and gates, basilicas, baths and gymnasia, a bouleterion/odeion, a harbor, heroa, nymphaea, a prytaneion, a stadium, stoas, temples to the gods and imperial cult, and a theater (Fig. 5.2). In the Late Roman period, the city continued as the seat of a governor and bishop. By the seventh century A.D., having suffered from the gradual silting of the harbor and administrative breakdown, the reduced population was concentrated in a small area in front of the theater. Ephesos was abandoned when settlers moved to the nearby hill of Ayasoluk in the tenth century A.D.

Once one of the major harbor cities of the Roman period, the ancient city is now landlocked, and lies six km inland from the Aegean as a result of alluvial deposition from the Cayster river. Millions of cubic meters of sediment have been deposited over the course of several millenia, filling in a bay ten km wide by 15 km long and raising the course of the flood plain.[381] The steady encroachment of sand and silt reconfigured the urban topography of Ephesus in fundamental ways. From the Classical to Late Roman periods, the locations of the harbors continually shifted westward, necessitating large and costly engineering projects. These environmental realities form the backdrop for the quarrying industry. In earlier periods, the course of the river may have served as a natural transportation route for bringing marble from some of the local quarries directly

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[380] Aelius Aristides, Orationes 23.34.
[381] J. Kraft, H. Brückner, I. Kayan, and H. Engelmann, "The Geographies of Ancient Ephesus and the Artemision in Anatolia," Geoarchaeology 22.1 (2007) 121-149; J. Kraft, H. Brückner, and I. Kayan, "Paleogeographies of Ancient Coastal Environments, in Environs of the Feigengarten Excavation and the 'Via(e) Sacra(e)' to the Artemision at Ephesus," in P. Scherrer, H. Taeuber, H. Thür (eds.), Steine und Wege: Festschrift für Dieter Knibber zum 65 Geburtstag (Vienna 1999) 91-100.

to a building site, and during the Roman period, the maintenance of the premiere harbor of Asia guaranteed Ephesus' participation in the international marble trade.

Quarries at Ephesus

The enormous amounts of stone needed to build Ephesus' civic infrastructure were readily available in the city and its hinterland. Ephesus lies between two major geologic metamorphic zones: the Cycladic complex and the Menderes massif. Additionally, tectonic slices of the Lycian nappes have cut into sections of the Menderes massif just south of Ephesus, and are the northernmost exposure of the Lycian nappes in western Turkey (Fig. 5.3).[382] A major thrust sheet belonging to the Cycladic metamorphic complex was emplaced over the metamorphic rocks of the Menderes massif; the precise contact location is difficult to determine because of the deposition of alluvial sediment from the Cayster river.[383] Ephesus' position between two major geologic units allows for discrimination between the quarries located in each zone as recent scientific studies have shown.[384]

Nearly 50 different quarries have been discovered in the region around Ephesus. The entire group stretches from the modern towns of Kuşadası to Torbalı and covers an area of approximately 500 km^2 (Fig. 5.4). It is likely that there are more since a regional

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382 T. Güngör, B. Erdoğan, "Emplacement Age and Direction of the Lycian Nappes in the Söke-Selçuk Region, Western Turkey," International Journal of Earth Sciences 89 (2001) 874-882.
383 A. Okay, "Stratigraphic and Metamorphic Inversions in the Central Menderes Massif: A New Structural Model," International Journal of Earth Sciences 89 (2001) 709-727.
384 W. Prochaska and S. Grillo, "A New Method for the Determination of the Provenance of White Marbles by Chemical Analysis of Inclusion Fluids: The Marbles of the Mausoleum of Belevi/Turkey," Archaeometry 52.1 (2010) 67-68; A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, Greco Scritto, and Bigio Varieties," Archaeometry 53.2 (2011) 215-240.

archaeological survey has not been carried out in the region. While the Ephesian quarries have not been the subject of systematic research, individual sites have been studied in enough detail to allow for a reconstruction of ancient quarrying landscapes.

The quarries to the south of Ephesus have been described in some detail by the Austrian archaeologist W. Vetters.[385] Quarries located closest to the city were on the north, east and west sides of the Panayırdağ, and the dark grey marble was exploited throughout the Archaic/Classical, Hellenistic, and Roman periods (Fig. 5.5); Vetters estimates around 133,000 m^3 of total stone was removed. On the westernmost hill of the Bülbül mountain were a series of four marble quarries that furnished a white and grey banded marble and yielded around 20,000-60,000 m^3 of stone. Further to the west on the Ideli hill are the five grey and white quarries Vetters believed to be the main Hellenistic and Roman quarries based on his estimate of 250,000-300,000 m^3 of stone removed. A series of six quarries located near the beach at Pamucak were nearly all the same size, measuring 12,800 m^3 each (76,800 m^3 total); four of these quarries produced a red breccia, while the others yielded a white-gray marble. Another four quarries of a coarse grained marble lie 11 km away from Ephesus on the peninsula near Kuşadasi and produced approximately 12,000 m^3 of marble. Recently, a well-preserved quarry that furnished a

[385] W. Vetters, "Ancient Quarries around Ephesus and Examples of Ancient-Stone Technologies," in P. Marinos and G. Koukis (eds.), The Engineering Geology of Ancient Works, Monuments and Historical Sites Volume 4 (Rotterdam 1990) 2067-2068; W. Vetters, "Zur Geologie der Antiken Steinbrüche von Ephesos: Erläurterungen zu der geologischen Übersichtskarte der Umgebung von Ephesos," in Manuscript in the D.P Crouch Collection (1998).

white marble was discovered while a pool was being excavated in a private property near Selçuk.[386]

Six km to the north of Ephesus are two quarries located on top of the Kuşını Tepe hill, described in detail by the Turkish archaeologist E. Atalay.[387] The main quarry on Kuşını Tepe is an impressive underground gallery supported by two large pillars, and nearly 20,000 m^3 of a banded blue and white marble was extracted from there (Fig. 5.6). 200 m to the south, a quarry furnished the same kind of marble, and preserves a series of quarry faces ten m high. The transportation routes followed the steep seasonal streambeds 435 m down before reaching the level plain that extends south to Ephesus.

An extensive series of quarries lies in the hills across the lake from the Belevi Mausoleum (Fig. 5.7). Engravings and Carian inscriptions found on the face of the quarry known as Belevi were documented in the late 1960's by W. Alzinger and W. Dressler.[388] The figural carvings, reminiscent of archaic statuary, and the Carian inscriptions, written by the quarrymen, indicate that it was opened in the sixth century B.C. The marble extracted from here was likely used for the construction of the Temple of Artemis and the depths of the figures, which are low on the quarry wall and nearly at ground surface, demonstrate that most of the material removed was done so in this period. A list of late Roman names preserved nearby, however, indicates that the quarries remained opened throughout the Roman era. Ongoing work carried out by an Italian

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[386] The quarry has been named Farm. A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, *Greco Scritto*, and *Bigio* Varieties," Archaeometry 53.2 (2011) 221-225, 229, 232, 233.
[387] E. Atalay, "Die Antiken Marmorsteinbrüche von Kuşını," Lebendige Altertumswissenschaft (Wien 1985) 311-314.
[388] W. Alzinger, "Ritzzeichnungen in den Marmorbrüchen von Ephesus," Des Österreichischen Archäologischen Institutes in Wien (1966-1967) 61-72; W. Dressler, "Karoide Inschriften im Steinbruch von Belevi," Des Österreichischen Archäologischen Institutes in Wien (1966-1967) 73-76.

team has uncovered at least half a dozen new quarries in the region north of Ephesos; some of them have been documented more thoroughly than others.[389] They have discovered that the upper levels of the Belevi quarry furnished good quality dark grey/black marble. The Kentli Ciftliği quarries, located just behind the Belevi quarry 3.7 km northwest of the Mausoleum, produced between 12,000-32,000 m^3 of white marble. The Göllüce and Aya Klıkırı quarries lie in the same hills; the thin marble layers prohibited blocks larger than 0.50 cm from being extracted.[390] The Urfalidağı Tepesi and Ahmetli quarries, 16 km NW from Ephesus and 5.25 km and and 8.25 km NW of the Belevi Mausoleum, respectively, furnished a white marble similar to those around Belevi region. The quarry farthest from Ephesus is located close to the modern town of Torbalı, 25 km north of Ephesus, and two km north of the ancient city of Metropolis; it furnished a white marble.

In certain Ephesian quarries, the banded gray and white medium grain marble makes it visually indistinguishable from medium grain Proconnesian marble, while in others, the marble is a pure white. In many cases, the regional quarries have not been described in enough detail to identify these visual differences; issues surrounding scientific discrimination between Ephesian and Proconnesian marble will be discussed in more detail below.

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[389] W. Prochaska and S. Grillo, "A New Method for the Determination of the Provenance of White Marbles by Chemical Analysis of Inclusion Fluids: The Marbles of the Mausoleum of Belevi/Turkey," Archaeometry 52.1 (2010) 59-82; A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, *Greco Scritto*, and *Bigio* Varieties," Archaeometry 53.2 (2011) 215-240.

[390] M. Waelkens, "Survey in the White Quarries of Anatolia," Araştırma Sonuçları Toplantısı IV (1986) 116-117.

A quarrying district 22 km northeast of Ephesus was first mentioned briefly by M. Waelkens and is the subject of ongoing research by the Italian team.[391] The zone includes approximately a dozen different marble quarries clustered around the village of Hasançavuslar, 22 km northeast of Ephesus. The quarries provided three different marble colors; a medium grain marble with distinctive light and dark bluish-grey veins on a white background is found in three large quarries, one of which produced approximately 30,000 m^3 of material (Fig. 5.8); lenses of a dark gray marble are present in the inner portions of these quarries; and an additional nine quarries, eight of which are small and one of which is very large, furnished a white marble. D. Attanasio and M. Bruno have identified the streaky blue and white marbles as *greco scritto*, named by Italian masons after its similarity to Greek writing (Fig. 5.9).

Recent scientific analyses have distinguished the geologic ages of the marbles around Ephesus with the result that chemical analyses allow for discrimination between different quarries. The quarries around Belevi and Kuşını belong to a Jurassic-Cretaceous series, while the marble of Urfalidağı Tepesi and Kentli Çiftliği are situated in the Permo-Carboniferous strata; the two separate isotopic fields reflect the two geologically different groups of marbles.[392] Additional research shows that the isotopic analyses carried out on twelve of the white marble quarries at Ephesos produced further intra-site discrimination; because the study did not include a geological description of the

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[391] M. Waelkens, "Survey in the White Quarries of Anatolia," Araştırma Sonuçları Toplantısı IV (1986) 117, 125; A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, *Greco Scritto*, and *Bigio* Varieties," Archaeometry 53.2 (2011) 215-240.
[392] N. Herz, "Carbon and Oxygen Isotopic Ratios: A Database for Classical Greek and Roman Marble," Archaeometry 29 (1987) 35-43; W. Prochaska and S. Grillo, "A New Method for the Determination of the Provenance of White Marbles by Chemical Analysis of Inclusion Fluids: The Marbles of the Mausoleum of Belevi/Turkey," Archaeometry 52.1 (2010) 59-82.

marbles, it is not possible to comment on how isotopic signatures are related to their locations within various geological formations.[393] Four separate groups of white marble quarries display distinct isotopic signatures: group one includes the quarries of Göllüce, Torbalı, Ahmetli, Kentli Çiftliği, Urfalidagı Tepesi, and Hasançavuslar 2-4; group two includes Kuşını and Belevi (the Belevi and Kuşını quarries can be differentiated by their petrographic characteristics); the white marbles of Aya Klıkiri and Farm display additional distinct signatures (Fig. 5.10). The results of scientific analysis on the streaky blue and white marble from Hasançavuslar display overlapping signatures with other white Ephesian marbles. Analysis of the dark gray marbles from Panayırdağ and the upper levels of Belevi have not been reported on in detail, although initial tests show differences in color and grain size between the dark gray marbles. Researchers acknowledge that the intra-site discrimination is based on the assumption that all quarry sites have been recorded and that the database of Ephesian marbles is complete; however, the database does not include the group of quarries to the south of Ephesos reported on by Vetters. Further geological, archaeological, and chemical analysis is needed before we can consider the investigation of the Ephesian quarries exhaustive.

This brief survey of the quarries surrounding Ephesus demonstrates the vast amounts of marble extracted in the region. Estimates provided for the volume quarried exceed half a million cubic meters (554,000 - 664,000 m^3), essentially the same volume as the Dokimeion marble quarries (650,000 m^3); this number for the Ephesian quarries should be even higher since the volume of a number of quarries have not been counted in

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[393] A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, *Greco Scritto*, and *Bigio* Varieties," Archaeometry 53.2 (2011).

this survey. Even so, comparisons between quarried volumes and populations within the city may be helpful.

Population estimates for Ephesos vary widely from 50,000 to as many as 350,000.[394] Most scholars believe that the population of Ephesos in the second and third centuries A.D. was around 200,000; this is based on Aurelius Barenus' comment about feeding a citizenry of 40,000. Galen's comment about his own city of Pergamon that "if then our citizens number as many as 40,000; so also if you add their wives and slaves, you will find yourself admitting that you have increased to more than 120,000 people" has been critized by J. Russell, who believed it to be an exaggeration. Using a model of population density based on urban space in Pergamon, Russell calculated that the 230 hectares of habitable space held a population of 40,000 inhabitants within the city. Likewise, the space within the city of Ephesos of 345 hectares gives a population of 60,000. R. Macmullen and Duncan-Jones have criticized Russell's calculations of the habitable area of Ephesos and the population density of 147.8 people per hectare as too low. Using the correctives of Macmullen and Duncan-Jones, L. White has estimated a total population of 100,000 in the first century A.D.; using four models of demographic change that incorporate birthrate, deathrate, and migration, he estimates that the total population of the Ephesos, including its outlying territory, was 200,000 by the second century A.D.

At Aphrodisias, 120,000 m^3 of quarried marble served a population of ca. 15,000; at Ephesus, at least five times as much marble was quarried for a population of 100,000.

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[394] P. Scherrer (ed.), Ephesus: The New Guide (Turkey 2000) 27. For a discussion on demography, see M. White, "Urban Development and Social Change in Imperial Ephesus," in H. Koester (ed.), Ephesus: Metropolis of Asia (Valley Forge 1995) 40-49.

Given that not all of the quarries have been counted, the volume estimates of exploited stone presented by scholars suggest that the local marble sources met, and perhaps exceeded, local needs.

Marble Consumption at Ephesus

Use of Local Materials. Ephesus was the largest of the marble cities of Asia Minor, and nearly every one of its buildings was built out of the local marble. A. Bammer claims that the use of marble at Ephesus was a late phenomenon, and that the first use of marble is seen in the temple of Artemis and a marble wall in the unfinished *hekatompedos*, built in 600 B.C.[395] While the Artemis temple does represent the earliest and most conspicuous consumption of marble in the city and in the Greek world at the time, the investment of large-scale temple building is commensurate with other projects begun by Ionian Greeks in the late seventh century B.C.[396] The construction of the Archaic temple was financed by the Lydian king Croesos as is attested by the appearance of his name on sculpted column drums.[397] Architectural historians have spent nearly a century reconstructing the original layout of the temple.[398] The dipteros temple, measuring 57.26 m wide by 112.21 m long, had two rows of eight columns along the front with nine at the rear, and twenty along the sides. The surviving marble elements of

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[395] A. Bammer, "Marbles at Ephesus and their Relation to Paros," in D. Schilardi, S. Katsarou, D. Katsonopoulou, and C. Brenner (eds.), Paria Lithos (Athens 2000) 437-444.
[396] Traces of stone bases and foundations from an earlier temple dated no earlier than 700 B.C. preceded the construction of the Archaic temple. These earlier phases of the cult sanctuary were built from a soft yellow limestone, which comes from the Igdelitepe quarry close to the sea according to U. Muss, A. Bammer, L. Moens, P. De Paepe, J. De Donder, K. Koller, and M. Aurenhammer, "Provenance Study of Marble from the Artemision of Ephesus," ASMOSIA VIII online abstract.
[397] U. Muss, Die Bauplastik des Archaischen Artemisions von Ephesus (Vienna 1994)
[398] A. Bammer, Die Architektur des Jüngeren Artemision von Ephesus (Wiesbaden 1972); A. Ohnesorg, Der Kroisos-Tempel. Forschungen in Ephesus XII/4 (Wien 2007).

the temple - the threshold, bases, which consisted of a stylobate and plinth made from one piece of marble, sculpted column drums attached to marble columns, the entablature, and roof tiles indicate that the building was nearly entirely carved from marble.

The discovery of the marble sources used for the construction of the Temple of Artemis was even mythologized. While describing the temples of Ionia, Vitruvius digresses to tell the story of the shepherd named Pixodaros, whose accidental discovery of the quarries occurred when:

> two rams, butting together, overran one another, and in the rush, one of them struck a rock with his horns and a chip of the whitest color was thrown down. So Pixodarus is said to have left his sheep on the hills and to have run with the chip of marble to Ephesus at the time when there was a great discussion about the matter.[399]

Vitruvius says that Ephesian citizens decreed Pixodarus with divine honors, and that every month a civic magistrate set out to the place and offered a sacrifice to the shepherd. Alzinger wanted to connect this place of worship to a tumulus tomb located near the Belevi Mausoleum, which he presumed was Pixodaros' burial.[400] The story shows the significance of this supposed event to local history, and underscores the social and economic advantages of having good-quality local marble sources.

Bammer believed that the marble for the construction of the temple came from the Belevi quarry based on proximity, on the discovery of an unfinished Archaic kouros abandoned in the quarry, on the figural carvings and on the Carian inscriptions described

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[399] Vitruvius, On Architecture 10.2.15 (trans. F. Granger).
[400] W. Alzinger, "Ritzzeichnungen in den Marmorbrüchen von Ephesus," Des Österreichischen Archäologischen Institutes in Wien (1966-1967) 72.

above.[401] Isotopic analysis performed on samples from the stylobate and the roof point to the Belevi quarry in addition to an unknown signature probably from an undiscovered quarry located nearby. Vitruvius tells us that the architect Chersiphon coped with the problem of transporting marble columns and architraves, probably the largest made to date, by fitting them inside of wooden drums so that they could be drawn as rollers.[402] The technique was only possible because of the proximity of the quarries, which he tells the reader was no more than *milia passum octo* (11 km) from the construction site.

Destroyed by a fire in 356 B.C., the temple was reconstructed on an even grander scale during a spate of temple building in the region often referred to as the Ionian Renaissance; in this period the temple was known as one of the "Seven Wonders of the World." Pliny gives an account of a temple with 127 columns 60 feet in height, adorned with sculptural reliefs, one of which was carved by the famous sculptor Scopas.[403] Bammer approximates the net volume of marble used was around 50,000 m^3, a figure nearly ten times the amount used in the construction of the Temple of Aphrodite at Aphrodisias. The demand for building materials necessitated the opening of new quarries, and it is of interest that there is a noticeable difference between the pure white marbles employed in the archaic temple, and the white marbles with bluish-grey veins used in the

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[401] A. Bammer, "Marbles at Ephesus and their Relation to Paros," in D. Schilardi, S. Katsarou, D. Katsonopoulou, and C. Brenner (eds.), Paria Lithos (Athens 2000) 437-439.
[402] Vitruvius, On Architecture 10.2.11-12.
[403] Pliny, Natural History 36.21.

classical temple.[404] On the basis of isotopic analysis, U. Muss and Bammer believed that the marble was brought from the Kentli Çiftliği quarries.[405]

The best-preserved marble buildings of the Hellenistic period are all funerary monuments; they demonstrate Ephesus' importance as a marble carving center and that Ephesian craftsmen were capable of producing sophisticated architectural marble carving. The earliest of these is the late fourth or early third century B.C. Belevi Tomb, located 14 km northeast of Ephesus, whose occupant was most likely Lysimachos or Antiochos II.[406] The half rock-cut, half-built tomb was styled in the fashion of other regional fourth century B.C. funerary monuments, such the Nereid Monument at Xanthos and the Mausoleum of Halikarnassos. An estimated 2,500 m^3 of marble was extracted from the nearby quarries for its construction. W. Prochaska's detailed scientific analysis suggested that the main marble used in the construction of the mausoleum originated in the Kentli Çiftliği quarries, the same marble that Bammer argued was used in the building of the classical Artemision.[407] By the late Hellenistic period in the first century B.C., the *Embolos* was lined with large marble graves for local notables. H. Thür has claimed that the blue and white banded marble used in the two-storied Doric and Ionic Heroon with sculpted frieze and pediment reliefs was the tomb for Ephesus' legendary

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[404] A. Bammer, "Marbles at Ephesus and their Relation to Paros," in D. Schilardi, S. Katsarou, D. Katsonopoulou, and C. Brenner (eds.), Paria Lithos (Athens 2000) 441-442.
[405] U. Muss, A. Bammer, L. Moens, P. de Paepe, J. Donder, K. Koller, and M. Aurenahmmer, "Provenance Study of Marble from the Artemision of Ephesus," ASMOSIA VII (2003) online abstract.
[406] For the sculpture, see C. Praschinker and M. Theuer, Das Mausoleum von Belevi, Forschungen in Ephesus VI (Vienna 1979); for the reconstruction, see W. Hoepfner, "Zum Mausoleum von Belevi," Archäologischer Anzeiger (1993) 111-123; for a summary, see P. Webb, Hellenistic Architectural Sculpture: Figural Motifs in Western Anatolia and the Aegean Islands (Madison 1996) 76-79.
[407] W. Prochaska and S. Grillo, "A New Method for the Determination of the Provenance of White Marbles by Chemical Analysis of Inclusion Fluids: The Marbles of the Mausoleum of Belevi/Turkey," Archaeometry 52.1 (2010) 67-68.

founder, Androklos.[408] An elaborately octagonal-shaped monument is believed to have been the burial place of the youngest sister of Cleopatra VII, Arsinöe IV, known to have fled to Ephesus and been assassinated by Anthony in 41 B.C.[409] The Memmius Monument, built for the grandson of the Roman general Sulla, was built in the form of a triumphal arch, had piers embellished with karyatids and an attic story carrying reliefs of the honorand.[410] Scholars debate about whether several monuments belong to the late Hellenistic or early Roman imperial period, such as a relief depicting a battle scene with Galatians and group of sculptures depicting Odysseus in the Cave of Polyphemos from the Nymphaeum of Pollio.[411]

By the late second century B.C., epigraphic evidence indicates that Ephesian sculptors had made a name for themselves outside of their city.[412] B. Ridgway believed that an Ephesian family, who produced bronze and marble sculptures for export, worked in Delos, the Cyclades and on the Greek mainland.[413] Menophilos, son of Agasias, from Ephesus was active in Delos around 150 B.C. Agasias, son of Menophilos, from Ephesus (likely the son of the aforementioned Menophilos) signed more than ten sculptures, sculpture bases, and architectural elements on the island of Delos and Tenos. Agasias, son of Dositheos, from Ephesus, signed the Borghese Warrior found in Italy; another of

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[408] H. Thür, "The Processional Way in Ephesus as a Place of Cult and Burial," in H. Koester (ed.), Ephesus: Metropolis of Asia (Valley Forge 1995) 159-177.
[409] H. Thür, "The Processional Way in Ephesus as a Place of Cult and Burial," in H. Koester (ed.), Ephesus: Metropolis of Asia (Valley Forge 1995) 178-183.
[410] For the range of suggested reconstructions, see A. Bammer, Das Monument C. Memmius. Forschungen in Ephesus VII (Vienna 1971); U. Outschar, "Zum Monument des C. Memmius, Jahreshefte des Österreichischen Archäologischen Instituts in Wien 60 (1990) 57-85; P. Webb, Hellenistic Architectural Sculpture (Madison 1996) 82-83.
[411] See B. Ridgway, Hellenistic Sculpture II (Madison 2000) 115-117 and B. Ridgway, Hellenistic Sculpture III (Madison 2002) 27-29, respectively for summaries and bibliographies.
[412] J. Marcadé, Recuil des Signatures de Sculpteurs Grecs II (Paris 1957).
[413] B. Ridgway, Hellenistic Sculpture II (Madison 2002) 247, 271-273.

his works was found at Halos in Thessaly. It is interesting that this family, if we believe Ridgway's interpretation, maintained their ethnic origins despite the fact that they were born abroad. Ephesus' established reputation as a center for marble carving seems to have been a marketable claim for sculptors working away from home.

The traditions of marble carving that Ephesian artisans learned and excelled at throughout the Classical and Hellenistic periods continued unabated into the Roman period. These practices, a large and capable labor force, a sizeable population with a large and disposable income, as well as Ephesus' geopolitically advantageous location fostered a consumption of marble that may have been unparalleled outside of the imperial city of Rome. Local aristocrats embarked on grandiose public building programs through their own initiative, erecting nearly 50 new civic structures from the first to third centuries A.D. Roman emperors, rich families, well-established and aspirant politicians and priests, imperial freedman in charge of the *conventus civium Romanorum*, orators, and local guilds all contributed to outfitting the city in a manner befitting the largest city of Roman Asia. Inscriptions record private individuals giving gifts of imported marbles for civic building at Ephesus, such as C. Claudius Verulanus Marcellus and his wife Scaptia Philippe, who donated panels of revetment from Dokimeion for the portico walls, and the prytanis Dionysios Nikephorou, who paid for marble columns, again from Dokimeion.[414] These two cases, and another which will be discussed below, suggest that private individuals could purchase materials from the state quarries.

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[414] See, respectively, C. Börker, R. Merkelbach, H. Engelmann, and D. Knibbe (eds.), Die Inschriften von Ephesos, IK 12, Volume II (Bonn 1979) n. 430 and 661.

Augustus' decision to make Ephesus the Roman Proconsul's headquarters prompted the construction of an entirely new city quarter on the plateau between the Bülbüdağ and Panayırdağ. This upper portion of the city housed the traditional Roman and local Ephesian seats of government and religion. A prytaneion, bouleterion, and the state agora complex, which contained an agora, a basilical stoa and temple to Caesar and Roma, and the temple of the Emperors of the Koinon of Asia become the administrative heart of the Roman city. Subsequently, the Processional way was paved and crowded on either side with monuments, such as the Tetragonos agora, the Celsus library, and several monumental fountains. The ancient Koressian district was refurbished with projects that included the enlargement of the theater and stadium and the construction of the Vedius gymnasium. A former swamp area filled in with river silt was transformed into building ground for Ephesus' largest buildings, which included the Harbor Bath-Gymnasium, and adjoining *Xystoi*, and the temple of Hadrian as Zeus Olympios. Situated next to the harbor, these monuments were the first that those arriving by sea encountered.

Despite the numerous marble carving workshops, which must have existed in Ephesus, traces of permanent workshops and commercial venues are difficult to find. The installation in a western room of Terrace House 2 of a large water-powered saw mill along with abandoned blocks with parallel saw slits indicates that by the sixth or seventh century A.D. the area had become the locus for cutting stone, but it is highly unlikely that these activities took place when these luxurious apartments housed Roman elites.[415] A

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[415] T. Ritti, K. Grewe, P. Kessener, "A Relief of a Water-Powered Stone Saw Mill on a Sarcophagus at Hierapolis and its Implications," Journal of Roman Archaeology 20 (2007) 151-154; F. Mangartz, "Zur Rekonstruktion der Wasserbetriebene Byzantinische Steinsägemachine von Ephesus," Archäologisches Korrespondenzblatt 36.4 (2006) 573-590.

marble sarcophagus, dated to the second century A.D., depicts statue carvers in a sculpture workshop whose location is unknown.[416] A continuous frieze panel shows from left to right, a seated figure, sketching out the design, a master-sculptor chiseling the hand of a standing *himation* statue, a slave worker polishing a table leg, and another master carver chiseling the shoulder of a portrait bust. A second narrative shows three naked boys running in a gymnasium race. Smith has interpreted the sarcophagus scene as the workshop owner's statement of his rising social status; his prosperous marble carving business allowed him to send his children to an elite gymnasium school.[417]

Others pieces of fragmentary evidence lend clues to the location of marble workshops and sellers. An inscription, which I will described in more detail below, indicates that marble-sawing regularly took place on the harbor quay of Ephesus.[418] The cutting and storage of marble near water routes was convenient and practical. The marble yards of *Portus* at Ostia, the Emporium southwest of the Aventine and the western and northern banks of the *Campus Martius* in Rome show that this was common practice.[419] L. Robert has connected the ἐργάται mentioned in an inscription from the monumental harbor gate, and next to the statue of Poseidon, to marble ateliers.[420] Another possibility comes from two inscriptions found on columns on the theater street, which name the Asiarch M. Fulvius Publicianus Nikephoros as the benefactor of halls

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[416] G. Mendel, Musées Impériaux Ottomans. Catalogue des Sculpturess Grecques, Romaines, et Byzantines (Istanbul 1912-1914); Ş. Karagöz, "Zur Lokalisierung einer Marmorwerkstätte in Ephesus," in P. Scherrer, H. Taeuber, and H. Thür (eds.), Steine und Wege (Wien 1999) 55-59.

[417] R. Smith, "Marble Workshops at Aphrodisias," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor. Journal of Roman Archaeology Supplement 80 (Ann Arbor 2011) 66-68.

[418] Supplementum epigraphicum graecum XIX 684.

[419] M. Maischberger, Marmor in Rom. Anlieferung, Lager- und Werkplätze in der Kaiserzeit. Palilia 1 (Wiesbaden 1997).

[420] R. Meriç, R. Merkelbach, J. Nollé (eds.), Die Inschriften von Ephesos IK 17.1, Volume 7.1 (Bonn 1981) n. 3216, lines 3-4; L. Robert, "Documents d'Asie Mineure," Bulletin de Correspondance Hellénique 101 (1977) 95.

reserved for corporations of artisans.[421] The so-called Servilius stoa, attested in other inscriptions and located in the same area as of the columns of Nikephoros' halls, contained a series of bays shared by money-changers, weavers, carpenters, and jelly-sellers. The area provided a permanent space to local guilds and trade associations selling their wares along a major intersection of the city, which was the first to receive traffic from the harbor.

Marble Importation. Perhaps the most remarkable aspect related to this study was Ephesus' propensity for consuming expensive imported materials for civic adornment. This section describes this phenomenon at Ephesus in some detail, but is not intended to be exhaustive.[422] It relies both on the evidence documented by archaeologists over the years and on the fieldwork I conducted at Ephesus from July 18-25, 2009. When possible, I cite the architectural studies that have identified various sources within their original context, but in many cases, the identifications are based on observations I made during the course of my fieldwork. As a partial survey, it focuses on importation of large-scale marble imports, illuminating consumption patterns by time period, material and building types.

The Tetragonos agora, whose main construction phase spanned the reigns of Augustus to Claudius, was a square form closed on all sides by two-aisled colonnades (Fig. 5.11). While the column shafts of the outer colonnade were made of local Ephesian marble, the columns of the inner colonnade were adorned exclusively with gray and purple monolithic granite shafts from the Troad; additionally, the columns in hall

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[421] D. Knibbe, "Der Asiarch M. Fulvius Publicianus Nikephoros, die Ephesischen Handwerkszünfte und die Stoa des Servilius," Jahresheft des Österreichischen Archäologischen Instituts 56 (1985) 71-77.

adjoining the east side of the agora were also made of the same material. The Tetragonos agora was decorated with a staggering amount of granite from the Troad, some 209 columns in total.[423] The monolithic granite columns from both the Troad and Aswan adorned the Olympeion. Granite monolithic columns from the Troad were also observed in the so-called Serapeion.

Importation increases markedly in the last half of the first century A.D. The two-storied façade of the *hydrekdocheion* of the Roman governor Gaius Laecanius Bassus (A.D. 80-82) was supported by monolithic columns of purple and white marble from Dokimeion and the red marble from Iasos.[424] The *scaenae frons* of the theater, built in two phases beginning under the reign of Domitian, carried three-stories of imported monolithic columns from Dokimeion. The original excavators noticed monolithic columns from Dokimeion, Teos, and an unknown source of pink alabaster; in the course of documentation of the stage building during the current project, the architectural elements were placed in the *palaestra* block of the theater gymnasium and I observed colored monolithic columns from Aswan, Bithynia, Carystos, Hierapolis, Iasos, Teos, and the Troad (Fig. 5.12).[425] The Harbor-Bath Gymnasium complex, completed as early as the Domitianic period, consisted of three separate units, all of which were richly-clad in marble imports: the bath block, *palaestra*, and *xystoi*, also named the Halls of Verulanus after their benefactor. In the bath block, the *frigidarium* was adorned with monolithic

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[423] W. Wilberg, Forschungen in Ephesus III (Wien 1922) 1-7.
[424] K. Jung, "Das Hydrekdocheion des Gaius Laecanius Bassus in Ephesus," in G. Wiplinger (ed.), Cura Aquarum in Ephesus (Leuven 2006) 83.
[425] R. Heberdey, Jahreshefte des Österreichischen Archäologischen Instituts in Wien 7 (1904); R. Heberdey, Jahreshefte des Österreichischen Archäologischen Instituts in Wien 8 (1905); A. Öztürk, "Zur *Scaenae Frons* des Theaters in Ephesus," Architectura 35 (2005) 8-10.

granite columns.[426] In the *palaestra*, the so-called *marmorsaal* were adorned with 13 different types of imported marbles (Fig. 5.13).[427] Out of these types, the early twentieth century excavators identify columns made from marble sources of Teos, the purple and white marble from Dokimeion, and an unknown source of pink alabaster; several purple and white monolithic columns from Dokimeion and a base made of gabbro can still be seen. According to an inscription carved on purple and white revetment from Dokimeion in the *xystoi*, Verulanus dedicated these for the building's refurbishment during the Hadrianic period.[428]

The armature of streets in Ephesus displayed a colorful array of monolithic columns from eastern Mediterranean locales. As a visitor to Ephesus walked down the Embolos, beginning in the administrative section of the city at the top of the hill, continuing on the extension past the theater, and stopping at the stadium, he or she would pass by monolithic columns of alabaster from Hierapolis, granites from the Troad and Aswan, and marble from Bithynia, Carystos, Dokimeion (the yellow and blue varieties), Iasos, and the blue and white streaky marble from Ephesos (Fig. 5.14).[429] If they instead turned and walked towards the harbor along the Arcadiane, they saw colonnades supported by monolithic columns of yellow alabaster from Hierapolis, purple and gray granite from the Troad, red, pink, and white breccia from Bithynia, green marble from

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[426] F. Miltner, Ephesus (Wien 1959) 47.
[427] O. Benndorg, Forschungen in Ephesus I (Wien 1906) 185; J. Keil, Führer durch Ephesus (Wien 1957) 73-75.
[428] C. Börker, R. Merkelbach, H. Engelmann, and D. Knibbe (eds.), Die Inschriften von Ephesos, IK 12, Volume 2 (Bonn 1979) n. 430.
[429] H. Thür, "Der Embolos: Tradition und Innovation anhand seines Erscheinungsbildes," in H. Friesinger and F. Krizinger (eds.), 100 Jahre Österreichische Forschungen in Ephesus. Akten des Symposions Wien 1995 (Wien 1999) 421-428 describes the evolution of buildings along the Embolos, but does not provide phasing for the marble colonnades. However, it is known that in the mid-second century A.D. the city provided funds for paving the street with marble.

Carystos, red, purple, and white marble from Chalcidicum, and the streaky blue and white marble from Ephesos. Measurements show that many of these columns date to the original phase of the street's construction in the second century A.D.; however, the refurbishment projects that occurred in the third, fifth, sixth, and seventh centuries A.D. make it difficult to reconstruct the original appearance with certainty.[430]

The importation of colored marbles peaked in the second century A.D. In the Bouleterion, the stairs, seats, and *scaenae frons* were built of white marble, with the latter accented with red Egyptian granite from Aswan.[431] Hadrian's three-storied Gate carried fluted monolithic columns in the first and third story made from two unknown types of imported marble, one with white inclusions with dark reddish-brown veins that may be a variety from Chios and the other white with small veins of purple.[432] Perhaps the most famous public monument in Ephesus to display lavish imported materials was the library, and tomb, of the proconsul of Asia, T. Julius Celsus Polemeanus, built in the first quarter of the second century A.D. The sumptuous two-story outer façade was adorned with large purple and white monolithic columns imported from Dokimeion that measured 5.35 m in height on the first story and 4.08 m on the second story (Fig. 5.15).[433] The library occupied the most prestigious real estate in the city. It was the focal point for any viewer walking down the marble street, and its colored columns, those in the nearby Hadrianic Gate and those that lined the Embolos, created a unifying architectural ensemble for the area.

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[430] P. Schneider, "Bauphasen der Arkadiane," in H. Friesinger and F. Krizinger (eds.), 100 Jahre Österreichische Forschungen in Ephesus. Akten des Symposions Wien 1995 (Wien 1999) 467-478.
[431] J. Wood, Discoveries at Ephesus, including the Site and Remains of the Great Temple (London 1877) 51; L. Bier, The Bouleterion at Ephesos. Forschungen in Ephesos IX/5 (Wien 2011).
[432] H. Thür, Das Hadrianstor in Ephesus. Forschungen in Ephesus XI/1 (Wien 1989) 63.
[433] J. Keil, Die Bibliothek. Forschungen in Ephesus V (Wien 1953).

The "Hestia Hall" of the prytaneion, where the prytaneis assembled, was added during the second quarter of the third century A.D. The four double-half columns in the corners of the podia were made from the white and black granite from Mons Claudianus and the blue-grey marble from Lesbos.[434] Elsewhere within the city, Fant has observed purple and white monolithic columns from Dokimeion in the *marmorsaal* of the Vedius Bath Gymnasium and the *hestiatorion* adjacent to the Artemis temple.[435]

The luxury apartments located in downtown Ephesus present an extraordinary example of the conspicuous consumption of imported marbles within a Roman *insula* house. The reconfiguration of residential unit six in Terrace House Two around the mid-second century A.D. allowed a visitor to enter directly from the *Curetes* street and proceed to a peristyle courtyard whose floors and walls were covered from top to bottom with expensive marble revetment. K. Koller identified at least different 30 types of marbles.[436] These include unidentified varieties of yellow and red alabaster, green porphyry from near Sparta, purple porphyry from Mons Porphyrites, red, pink, and white breccias from Bithynia and Skyros, green marble from Carystos, yellow and pink marble from Chemtou, a black marble identified as coming from Djebel Aziz in Tunisia, purple and white marble from Dokimeion, blue-gray marble from Lesbos, red and white marbles from Iasos, red marble from Taenaros, and the dark and light green marble from Thessaly. An ongoing restoration project has as its goal the reconstruction of the 120,000 fragments

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[434] M. Steskal, Das Prytaneion in Ephesus. Forschungen in Ephesus IX/4 (Wien 2010) 181-186.
[435] C. Fant, "Ideology, Gift, and Trade: A Distribution Model for the Roman Imperial Models," in W. Harris (ed.), The Inscribed Economy. Journal of Roman Archaeology Supplement 6 (Ann Arbor 1993) 154.
[436] K. Koller, Die Dekorative Marmorwandausstattung des sog. Marmorsaales im Hanghaus 2 in Ephesus, Ph.D. dissertation (Vienna 1999).

of marble revetment.[437] Initial work has shown that the walls were divided into three zones. On the socle zone, blocks cut from one block of green Carystian marble were installed as mirror images; above this was a zone with pilasters framed by purple and white panels from Dokimeion (Fig. 5.16); the uppermost area contained a series of *emblemata* displaying figural *opus sectile* panels, one of which depicted a snake wrapping itself around and drinking from a *kantharos* supported by a lion-headed club (Fig. 5.17). This elaborate architectural display indicates that the residence was semi-official and served as a meeting space, allowing the owner to reinforce his status and wealth.[438] Inscriptions reveal that the owner was a Gaius Flavius Furius Aptus, a priest of Dionysos.[439] His son belonged to the senatorial rank and was a Roman consul under Commodus in A.D. 275.

As part of the marble hall restoration project, S. Ilhan has recently discovered an important inscription on the back of a purple and white marble panel imported from Dokimeion. It records the third consulate of the Emperor Hadrian in A.D. 119 and the consulate of Gnaeus Arrius Augur in A.D. 121, giving a terminus post-quem for the installment of the decorative program, and indicating that these panels were ordered through the imperial quarry system described in chapter four. The name of the

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[437] http:/www.oeai.at/index.php/terrace-house-2-marble-hall.html
[438] P. Scherrer, "The City of Ephesus from the Roman Period to Late Antiquity," in H. Koester (ed.), Ephesus Metropolis of Asia (Valley Forge 1995) 7.
[439] For evidence concerning Aptus, see C. Börker, R. Merkelbach, H. Engelmann, and D. Knibbe (eds.), Die Inschriften von Ephesos, IK 12, Volume 2 (Bonn 1979) n. 502, 502a; H. Engelmann, D. Knibbe, R. Merkelbach (eds.), Die Inschriften von Ephesos, IK 13, Volume 3 (Bonn 1980) n. 675, 834; H. Engelmann, D. Knibbe, R. Merkelbach (eds.), Die Inschriften von Ephesos, IK 14, Volume 4 (Bonn 1980) n. 1099, 1267;C. Börker and R. Merkelbach (eds.), Die Inschriften von Ephesos, IK 15, Volume 5 (Bonn 1980) n. 1932a; R. Meriç, R. Merkelbach, J. Nollé (eds.), Die Inschriften von Ephesos IK 17.1, Volume 7.1 (Bonn 1981) n. 3064.

commissioner, G. Aptus, was painted in red on another block, and further corroborates the idea that Aptus had direct access to materials sold from the imperial quarries.

Case Study: Isotopic analysis of architectural marbles from the Terrace Houses. Three samples from the marble hall of Terrace House 2/31 at Ephesos were analyzed in the Stable Isotope Lab in the Department of Geological Sciences at the University of Michigan under the direction of K. Lohmann and L. Wingate (Fig. 5.18).[440] The samples were taken from one pilaster capital and two joining bases in the pilaster zone, framed by purple and white panels from Dokimeion, described above. Stylistic similarities between those in the Terrace house at Ephesus and those found in the North Temenos House at Aphrodisias have led scholars to believe that Aphrodisian sculptors may have carved pilaster capitals of this type (Fig. 5.19).[441] On the basis of stylistic similarities and the marble's white color and medium grain size, Koller identified the origin of the marble pilasters and bases in the marble hall as Aphrodisian.[442] The collection of samples from the Terrace houses was undertaken to determine whether Aphrodisias exported its marble regionally and more generally, to test the idea that stylistic affinities ascribed to certain workshops can authenticate the origin of a material.

The results listed in Table 5.1 and shown in cross plots in Figure 5.20 sorted by quarry; each sample was tested twice to ensure accuracy of the results. As with the isotopic analysis for Aphrodisias marble, the stable isotope values provided are expressed as $\delta^{13}C$ and $\delta^{18}O$ in per mil relative to the PDB standard. The carbon values for the

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[440] I am grateful to Martin Steskal for sending the samples to Ann Arbor.
[441] J. Kramer, "Korinthische Pilasterkapitelle in Kleinasien und Konstantinopel," Istanbuler Mitteilungen 39 (1994) 1; S. Dillon, "Figured Pilaster Capitals from Aphrodisias," American Journal of Archaeology 101.4 (1997) 74.
[442] K. Koller, "Ja, nicht stumm ist das Bild," Forum Archaeologiae. Zeitschrift für Klassiche Archäologie 14.3 (2000).

samples from the Terrace House cluster near 3‰, ranging from 2.87 to 3.11‰, while the oxygen values range from -3.23 to -4.64‰. The characteristic signature of the medium to coarse grain white marble from Aphrodisias, as described in chapter three, cluster together for carbon near 2‰, and range from 1.0 to 2.5‰, and for oxygen, range from -2.5 to -4.5‰. The isotopic signatures of the samples from the Terrace Houses therefore do not match the securely-established signatures of the white Aphrodisian marble.

The results of isotopic analysis fall within the range of signatures for Ephesian and Proconnesian white marble. The isotopic signatures for the Terrace House samples match those of the Ephesus Group 1 quarries (Göllüce, Torbali, Ahmetli, Kentli Çiftliği, Urfalidagı Tepesi, and Hasançavuslar 2-4) where the carbon values spread from 2.48 to 5.05‰ and oxygen values range from -2.19 to -8.26‰.[443] For white Proconnesian marble, the published carbon values cluster tightly near 2.5 ‰ and the oxygen values range from -6.57 to 0.28‰.[444] Figure 5.20 shows the Terrace House samples in relation to the carbon and oxygen values from the quarries at Aphrodisias, Ephesus, and Proconnesos.

The results of isotopic analysis cannot securely identify the marble either as Ephesian or Proconnesian. Proconnesian and Ephesian marble have similar macroscopic and isotopic features, although recent research has shown that the two marbles can be distinguished on the basis of trace element and EPR analyses.[445] The results of the samples from the marble hall in the Terrace House provide another piece of evidence that

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[443] A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, *Greco Scritto*, and *Bigio* Varieties," Archaeometry 53.2 (2011).
[444] D. Attanasio, M. Brilli, and N. Ogle, The Isotopic Signature of Classical Marbles (Rome 2006) 204-207.
[445] A. Yavuz, M. Bruno, and D. Attanasio, "An Updated, Multi-method Database of Ephesus Marbles, including White, *Greco Scritto*, and *Bigio* Varieties," Archaeometry 53.2 (2011).

export was not a feature of the Aphrodisian marble industry and show that stylistic affinities ascribed to Aphrodisian workshops cannot reliably be used to authenticate the origin of a material. Marble production centers – whether Ephesian or Proconnesian - produced and exported pilaster capitals similar in style to other regional workshops.

In addition to architectural adornment, a number of examples demonstrate that the Ephesian craftsmen specializing in relief and freestanding sculpture regularly worked with imported materials. For the most part, marble from the environs of Ephesus suited the local sculptural workshop's needs; continuous excavations have uncovered an exceptionally large quantity of both relief and freestanding statuary, and sculptures depict gods, heroes, athletes, philosophers, and portraits of the emperor, the imperial family, and local notables.[446] A statue of a barbarian found in the East Gymnasium was made from the purple and white marble from Dokimeion; a statue of an enthroned Serapis found in the theater was crafted from a dark gray marble, which may, however, have come from the Belevi quarries; a statuette of a Fisherman used a blue marble; the head of a Ganymede was carved from an ocher colored calcite; and a statue group of a Sphinx with her young male victim, found in the Marble hall of the Vedius Gymnasium, was made from a grey-green to blackish greywacke, likely imported from Egypt.[447] From the Terrace houses come a head of Attis carved in calcite, a third century A.D. emperor whose head is carved in white marble, and the bust in alabaster, and a young boy, whose head is carved in white, and the bust rendered in purple and white marble from

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[446] M. Aurenhammer, "Sculptures of Gods and Heroes from Ephesus," in H. Koester (ed.), Ephesus: Metropolis of Asia (Valley Forge 1995) 251-280; M. Aurenhammer, Die Skulpturen von Ephesus. Forschungen in Ephesus X/1 (Wien 1990)

[447] See the following statues listed respectively in M. Aurenhammer, Die Skulpturen von Ephesus. Forschungen in Ephesus X/1 (Wien 1990) No. 144, 79, 142, 103, and 148.

Dokimeion.[448] The Ephesian sculptural workshops also preferred the white dolomitic marble from Thasos for colossal statuary and architectural relief sculpture. The assignment of the Thasian dolomitic marble is relatively easy; as a coarse grained and a pure, white dolomitic marble, the combination of X-ray diffraction and carbon and oxygen isotopic analyses identify a signature that is unique to the Vathy district of Thasos.[449] Results of scientific analysis indicate that the Antonine satyr reliefs in the theater, the head of Zeus in the Pollio nymphaeum, a frieze with grapevines of unknown provenance within the city, and the colossal portrait statue of Titus were all made from the Thasian dolomitic marble.[450] The most spectacular use of Thasian dolomitic marble in Ephesus occurred in the over life-sized sculptural reliefs of the Parthian monument.[451] The scenes on the Great Antonine Altar, which celebrate Lucius Verus' adoption, his Parthian victories, and his apotheosis, indicate that the commissioner was highly placed within imperial circles, and had access to the choicest of marbles. Given the amount of different types of marbles being moved in and out of the city - mainly for large-scale

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[448] S. Erdemgil, Ephesus Museum (Istanbul 2000) 22-24.

[449] J. Herrmann and V. Barbin, "The Exportation of Marble from the Aliki Quarries on Thasos: Cathodoluminescence of Samples from Turkey and Italy," American Journal of Archaeology 97.1 (1993) 91-104; M. Bruno, L. Conti, L. Lazzarini, P. Pensabene, and B. Turi, "The Marble Quarries of Thasos: An Archaeometric Study," in L. Lazzarini (ed.), ASMOSIA VI (2002) 157-162; D. Attanasio, M. Brilli, and N. Ogle, The Isotopic Signature of Classical Marbles (Rome 2006) 136-145.

[450] J. Herrmann and R. Newman, "Dolomitic Marble from Thasos Near and Far: Macedonia, Ephesus, and the Rhone," in M. Schvoerer (ed.), Archéomatériaux. ASMOSIA IV (Bordeaux 1999) 296, 302 and J. Herrmann and R. Newman, "The Exportation of Dolomitic Sculptural Marble from Thasos: Evidence from Mediterranean and Other Collections," in Y. Maniatis, N. Herz, and Y. Basiakos (eds.), The Study of Marble and Other Stones Used in Antiquity. ASMOSIA III (London 1995) 78, 83, table 3, fig. 9.

[451] J. Herrmann and R. Newman, "Dolomitic Marble from Thasos near and far: Macedonia, Ephesus, and the Rhone," in M. Schvoerer (ed.), Archéomatériaux. ASMOSIA IV (Bordeaux 1999) 296, 302; J. Herrmann and R. Newman, "The Exportation of Dolomitic Sculptural Marble from Thasos: Evidence from Mediterranean and Other Collections," in Y. Maniatis, N. Herz, and Y. Basiakos (eds.), The Study of Marble and Other Stones used in Antiquity. ASMOSIA III (London 1995) 78, 83, table 3, fig. 9; W. Oberleitner, "Die Apollon-Heliosplatte des Partherdenkmals – ein Neufund," Jahresheften des Österreichischen Archäologischen Institutes 64 (1995) 39, n. 4; T. Ganschow, "Überlegungen zum Partherdenkmal von Ephesus," Archäologischer Anzeiger (1986) 209-221.

architectural decoration - it is unsurprising that the Ephesian sculptural workshops also brought in materials from abroad. The importation of a foreign white marble to a city with locally abundant sources is, however, somewhat unusual, and may indicate that the marble sources of Ephesus were not suitable for sculpture in certain instances. The identification of Thasian dolomitic marble in freestanding and relief sculptures from Chios and Symrna indicate that it was also imported and prized among other Asia Minor ateliers. In particular, the use of Thasian marble in Asia Minor seems to have been reserved for large-scale architectural relief or colossal marble statuary. The overview of the quarries in the territory of Ephesus has shown that not all of the marble was a pure, white marble; much of it was a banded gray and white. Perhaps, as in the case of Aphrodisias, in the quarries producing a pure white source, the marble was not of a high enough quality to obtain blocks for large-scale sculpture. Moreover, the transportation of Thasian marble would have been relatively easy given that the distance between the two sites (375 km as the crow flies) was covered entirely by sea; the cost recorded in Diocletian's Price Edict was also relatively low. The importation of both white and colored marbles to a city with abundant marble resources of their own seems to have been a privilege of sculptural workshops well-connected to marble trading networks within the eastern Mediterranean.

In addition to being center for marble architecture and sculpture, Ephesian workshops engaged in the serial production of half-finished garland marble ossuaries and sarcophagi, a handful of which were exported to Aquileia, Neapolis, Rome, Pisa, Ostia,

Modena, Adana, and Beirut.[452] The workshops crafted other types of sarcophagi common throughout Asia Minor, but these were never produced in large numbers. Ephesus was also a consumer of imported sarcophagi made throughout the Mediterranean that served both a rich local and foreign clientele. The half-finished garland sarcophagi imported from Proconnesos may have received their final touches in the Ephesian workshops. A ribbon sarcophagus, the type of which was regularly produced in Rome, was imported to Ephesus in the late third century A.D.[453] Most interestingly of all, the elaborate figural sarcophagi made in Athens dominated the Ephesian market by the second quarter of the third century A.D., entirely eclipsing local production.[454]

The vast majority of the building and sculptural materials, most of which were white marbles, were from the local sources outlined above. The locally available streaky blue and white marble from Hasançavuslar was used at Ephesus for decorative purposes (monolithic columns, revetment, and bases) and in the manner of and as an alternative to expensive imported materials.[455] As a whole, architectural elements, such as monolithic columns, bases and wall revetment, form the bulk of the materials imported to Ephesus; the use of foreign marbles for sculpture is unique among marble-rich sites. The purple and white marble from Dokimeion was used the most frequently in at least eight different buildings. The bulk of decorative marbles came in equal measure from Asia Minor (10)

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[452] C. Thomas and C. İçten, "The *Ostothekai* of Ephesus and the Rise of Sarcophagus Inhumation: Death, Conspicuous Consumption, and Roman Freedmen," in G. Koch (ed.), Akten des Symposiums des Sarkophag-Corpus 2001 (Mainz am Rhein 2007) 335-344; G. Koch, "Kaiserzeitliche Sarkophage in Ephesus," in H. Friesinger and F. Krizinger (eds.), 100 Jahre Österreichische Forschungen in Ephesus. Akten des Symposions Wien (Wien 1995) 555-568; G. Koch, Römische Sarkophage (München 1982) 519-525.

[453] G. Koch, Römische Sarkophage (München 1982) 73-76.

[454] E. Rudolf, Attische Sarkophage aus Ephesus (Wien 1989).

[455] This blue and white streaky marble was the primary building material used in Metropolis, the town located closest to the quarries.

and Greece (9); Egypt (5) and North Africa (2) are also well represented. As elsewhere, the consumption of expensive marbles reached a peak in the second century A.D., yet in comparison to other cities examined in this study, trade began earlier and occurred at a greater rate.

Ephesus and the Marble Trade

With a holistic picture of marble exploitation and consumption patterns at Ephesus now drawn, I will argue that Ephesus' abundance of marble resources, its established marble-carving traditions, and its position as center of trade, religion, and provincial administration allowed it to flourish as a dynamic participant in the international Roman marble trade.

In addition to importing foreign marbles, Ephesus may have exported its own local marble sources as suggested by a number of scientific studies. T. Cramer has argued that Ephesus was a supplier to marble-poor Pergamon as early as the Hellenistic period. Results of petrographic, isotopic, and geochemical analyses performed on samples from the Hellenistic temple of Dionysos built under Eumenes II identify the banded blue and white marble as coming from the Kentli Ciftliği quarry from Ephesus; perhaps the same marble used for the classical Artemision.[456] These results of geochemical analysis, and in particular consistent ratios of rare earth elements that allow for discrination between quarry sites, make this assignment more reliable. Additionally, the samples fall outside the normal range for Proconnesian due to their more negative

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[456] T. Cramer, Multivariate Herkunftsanalyse von Marmor auf Petrographischer und Geochemischer Basis, Ph.D. dissertation (Berlin 2004) 231-233.

oxygen values. Corinthian capitals in the southern Severan nymphaeum at Perge have been identified as coming from Ephesus; this assignment is less secure since isotopic analysis was the only test carried out.[457] Similarly, the trace elements analysis conducted on a Late antique statuette group of Ganymede and the eagle, found in a cistern under the House of the Greek Charioteers in Carthage, pointed toward Ephesian marbles as being the most likely quarry source.[458] Although the database for white marbles was still in its early stages at the time of this study, an Ephesian provenance was reinforced by E. Gazda's analysis of the style and technique of the Ganymede group.[459] She demonstrated that the statuette's facial features, form of its chlamys, a highly polished surface, type of drill work, and the presence of a marble strut at the back of the neck were consistent with numerous statues in found in Asia Minor ateliers and in particular with Ephesian workmanship.

Attanasio and Bruno have identified the blue and white streaked marble as a variety of the so-called *greco scritto*, and used in private contexts throughout North African towns[460] and in central Italy. The streaky blue and white marble variety of *greco scritto* found in the quarries near the ancient town of Hippo Regius and in modern Cap de Gard, Algeria has traditionally been regarded as the most important source of this type of exported marble; although the existence of varieties in Proconnesos, Carrara, and Thasos

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[457] J. Herrmann and R. Tykot, "Some Products from the Dokimeion Quarries: Craters, Tables, Capitals and Statues," Y. Maniatis (ed.), ASMOSIA VII (Athens 2009) 65.
[458] L. Davis, "Appendix 8: Neutron Activation Analysis of the Ganymede Group," in J. Humphrey (ed.), Carthage VI, University of Michigan Excavations at Carthage 1977 (Ann Arbor 1981) 160, 189-190.
[459] E. Gazda, "A Marble Group of Ganymede and the Eagle from the Age of Augustine," in J. Humphrey (ed.), Carthage VI, University of Michigan excavations at Carthage 1977 (Ann Arbor 1981) 125-178.
[460] F. Antonelli, L. Lazzarini, and S. Cancelliere, "On the White and Coloured Marbles of the Roman Town of Cuicil (Djemila, Algeria), Archaeometry 54.2 (2010) 575-596.

have been discovered, they have not been investigated.[461] Recent results from chemical analyses have shown that discrimination between the Ephesian and Algerian sources is possible; and on the basis of resampling of several artifacts found in North African and Italian contexts, the authors suggest that the Hasançavuslar was not only an alternative to, but the primary exported source of this streaky blue and white marble variety of *greco scritto*.[462] Further research is needed before definitive conclusions can be drawn. The Ephesians, like the Aphrodisians, also targeted local colored sources similar to internationally-exported marbles for local adornment. Ephesus' coastal location may have helped this marble, a type already popular in the West, achieve a wider distribution.

Ephesus' geopolitical, geographical, and geological situation played the major role in the trajectory of its urban history and largely determined the degree to which it participated in the international marble trade both as a marble consumer and exporter. Strabo's designation of Ephesus as the greatest emporium of Asia Minor presupposes a continuous flow of commercial goods to and from the city.[463] Ephesus was known to have exported common commodities, such as olive oil and wine, as well as more specialized, locally-produced goods, such as miniature silver statuettes of Artemis, oil lamps, and ruddle, a type of paint; it imported slaves as well as luxury items, such as purple-dyed textiles and Egyptian grain.[464] As a producer/consumer city, these

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[461] F. Antonelli, L. Lazzarini, S. Cancelliere, D. Dessandier, "Minero-petrographic and Geochemical Characterization of '*Greco Scritto*' Marble from Cap de Garde, near *Hippo Regius* (Annaba, Algeria)," Archaeometry 51.3 (2009) 351-365.
[462] D. Attanasio, B. Yavuz, M. Bruno, J. Herrmann, R. Tykot, A. van den Hoek, "On the Ephesian Origin of *Greco Scritto*" ASMOSIA IX (Tarragona 2009).
[463] Strabo, Geography 12.8.15.
[464] H. Pleket, "The Roman State and the Economy: The Case of Ephesus," in J. Andreau, P. Briant, and R. Descat (eds.), Économie Antique. Les échanges dans l'Antiquité: Le Role de l'État, Entretiens d'Archéologie et d'Histoire (Saint-Bertrand de Comminges 1994) 115-126.

industries within the city attracted merchant associations from Beirut, Tyre, and Italy and profit-seeking ship-owners and traders.[465] Moreover, the installment of the *Monumentum Ephesenum*, and its documentation of customs laws, in Ephesus attest its importance as the main port entry to Asia and implies a brisk trade through harbors and inland towns.[466] Ephesus' diversified economy is most vividly represented by the corporation of fisherman, who financed the construction of a fishing toll-house paved in imported "Phocaean stone."[467]

The transit of marble goods relied on the maintenance of Ephesus' harbor; its upkeep was paramount for trading activities in general. By the end of the first century B.C., the city began its centuries-long struggle to keep the silt out of the harbor in order to maintain a port with waters deep enough to give access to large cargo ships. Epigraphic and archaeological evidence points to continual maintenance problems. Drill cores have shown that excess silt was dredged out of the harbor, and recent excavations and surveys have determined that in the Roman period, the harbor basin had to be moved to the west, and that little by little, an artificial channel was laid out and between the harbor bay and the open sea, and that a dam was constructed to contain alluvium.[468]

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[465] L. White, "Urban Development and Social Change in Imperial Ephesus," in H. Koester (ed.), Ephesus: Metropolis of Asia (Valley Forge 1995) 60, 76-79; H. Pleket, "The Roman State and the Economy: The Case of Ephesus," in J. Andreau, P. Briant, and R. Descat (eds.), Économie Antique. Les Échanges dans l'Antiquité: Le Role de l'État, Entretiens d'Archéologie et d'Histoire (Saint-Bertrand de Comminges 1994) 115-126.

[466] H. Pleket, "The Roman State and the Economy: The Case of Ephesus," in J. Andreau, P. Briant, and R. Descat (eds.), Économie Antique. Les Échanges dans l'Antiquité: Le Role de l'État, Entretiens d'Archéologie et d'Histoire (Saint-Bertrand de Comminges 1994) 119; M. Cottier, M. Crawford, C. Crowther, J. Ferrary, B. Levick, O. Salomies, and M. Wörle, The Customs Law of Asia (Cambridge 2008).

[467] H. Wankel (ed.), Die Inschriften von Ephesos, IK, Volume 1a (Bonn 1979) n. 20.

[468] http://www.oeai.at/index.php/paleography.html; J. Kraft, H. Brückner, I. Kayan, and H. Engelmann, "The Geographies of Ancient Ephesus and the Artemision in Anatolia," Geoarchaeology 22.1 (2007) 121-149; H. Zabehlicky, "Preliminary Views of the Ephesian Harbor," in H. Koester (ed.), Ephesus: Metropolis of Asia (Valley Forge 1995) 206-210.

Major efforts to revive the harbor are attested on seven different occasions by both imperial officials and the local aristocratic elite alike, beginning as early as the second century B.C., intensifying in the second century A.D., and continuing through the third century A.D.[469] Perhaps the largest project was undertaken by Hadrian, who revitalized the area by diverting the Cayster and built a dam to block the sediment from reaching the harbor.[470] An edict issued by the governor L. Antonius Albus in A.D. 147 ordered that building materials should not be cut on the quay and that emery and stone dust should not be thrown in the harbor canal since the weight from storing materials on the quay would weaken the pillars of the wall and the dust generated from stone sawing would fill up the harbor basin, making the quay inaccessible.[471] Although this is the only inscription referencing the marble trade at Ephesus, it is possible that marble-traders maintained permanent presence there. Albus addresses his edict directly to those who import stones (τούς λίθους εμπορευόμενοις).[472] In two second century A.D. inscriptions in Italy, those dealing in the commerce of stones were similarly named λιθέμπορος, and in Thasos, ἀρχικερδέμπορος. Excavations near the harbor revealed cells built into the pier walls that appear to be depositories for off-loaded commercial goods, and are perhaps the same storage areas Albus outlawed in his edict.[473]

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[469] H. Zabehlicky, "Die Grabungen im Hafen von Ephesus 1987-1989 in H. Friesinger and F. Krinzinger (eds.), 100 Jahre Österreichische Forschungen in Ephesus: Akten des Symposiums (Vienna 1999), 479-484 and M. Maischberger, Marmor in Rome (Wiesbaden 1997).
[470] P. Scherrer, "The Historical Topography of Ephesus," D. Parrish (ed.), in Urbanism in Western Asia Minor: New Studies on Aphrodisias, Ephesus, Hierapolis, Pergamon, Perge and Xanthos. Journal of Roman Archaeology Supplement 45 (Ann Arbor 2001) 57-87.
[471] Supplementum Epigraphicum Graecum XIX 684.
[472] C. Bouras, "The Circulation des Pierres et le Port d'Éphèse," in P. Jockey (ed.), ASMOSIA VIII (Aix-en-Provence 2009) 497.
[473] C. Bouras, "The Circulation des Pierres et le Port d'Éphèse," in P. Jockey (ed.), ASMOSIA VIII (Aix-en-Provence 2009) 497.

Most scholars believe that the port of Ephesus was the final destination for marbles arriving from the inner-Anatolian quarries of Dokimeion; the marbles were hauled 321 km overland from Phrygia along the northern banks of the Maeander river to Ephesus before the heavy marbles were loaded onto boats and shipped to Italy and the west.[474] The appearance of the purple and white marble from Dokimeion in at least eight different buildings within the city corroborates the idea that Ephesus was the end point of the trade route. Given the marble's popularity in imperial building projects in Rome from the reigns of Augustus to Septimius Severus, an infrastructure for the trade in Phrygian marbles must have been in place at Ephesus very early in the Roman imperial period.[475]

As the land-route terminus for Dokimeion marbles, Ephesus is an unusual case as it was well-equipped to receive, and perhaps profit, from the distribution of both Dokimeion marbles and other types of marbles. Ephesus was both a transport center and a commercial harbor for marble goods, and as such, local, regional, and international networks interacted and overlapped in ways not seen elsewhere in Asia Minor. In the Roman period, a steady stream of marble imports and exports passed through Ephesian shores, moreso than any other city examined in this study. The city took advantage of its harbor to import marbles from international sources throughout the Mediterranean and

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[474] M. Waelkens, Dokimeion: Chronologie und Typologie Ihrer Production (Berlin 1982) 124-125; C. Fant, Cavum Antrum Phrygiae: The Organization and Operation of the Roman Imperial Marble Quarries in Phrygia, BAR International Series 482 (Oxford 1989) 90; M. Christol and T. Drew-Bear, "De Lepcis Magna à Aizanoi: Hesperus Procurateur de Phrygie et l'Administration des Carrières de Marbre" in J. Desmulliez and C. Hoet-Van Cauwenberghe (eds.), Le Monde Tomain à Travers l'Épigraphie: Méthodes et Pratiques: Actes du XXIVe Colloque International de Lille, 8-10 Novembre 2001 (Lille 2005) 199 n. 35; A. Hirt, "Chresimus, *Procurator a Marmoribus* und der Strassenbau – Überlegungen zu Logistik und Transportwesen Kaiserlicher Steinbrüche," in R. Frei-Stolba (ed.), Siedlung und Berkehr im Römische Reich (Bern 2004) 119, n. 15.

[475] C. Fant, Cavum Antrum Phrygiae: The Organization and Operation of the Roman Imperial Marble Quarries in Phrygia, BAR International Series 482 (Oxford 1989).

local artisans, builders, and benefactors tapped into high prestige marble trading networks on a regular basis. Imported marbles were used in buildings traditionally associated with colorful architectural decoration - nymphaea, baths, theater, colonnaded streets, and private homes - but also in buildings that were not - the Library of Celsus, the Tetragonos agora, the bouleterion, and the prytaneion. At least 30 different types of decorative stone were used in 11 different public buildings; the numbers shows that Ephesus exceeded normative patterns of marble consumption. The regular importation of Thasian marble and other types of stone to the Ephesian sculptural workshops are suggestive of easy access to marble trade networks; this practice also shows that local sculptors were capable of carrying out commissions in a variety of stones. It is unclear if marble artisans from Ephesus continued to circulate as they did centuries earlier in the Hellenistic period or if sculptors from other regional marble production centers were attracted to Ephesus. No Ephesian sculptor's signatures are attested in the Roman period, but the factors described above suggest they may have traveled to work on commissions throughout the Mediterranean, albeit more anonymously than those from Aphrodisias and Dokimeion.

At the same time, the city relied in large part on its own local marble resources for civic adornment. A large number of local marble sources were opened up in the surrounding territory, and attest a competitive local market for selling marble. As the endpoint for the route from the Dokimeion quarries, and perhaps other Anatolian sources, Ephesus was equipped with an infrastructure ready to receive and ship heavy stone. This same harbor may have aided the exportation of its own local source of the streaky blue and white marble variety of *greco scritto*, and possibly, a limited number of finished products in the local white marble. Select marbles from Ephesus seem to have achieved

regional distribution, and as such, Ephesus participated in the marble trade both as a consumer and as a supplier. The consumption of so many foreign marbles and the possible exportation of its local sources indicate that the marble trade formed a significant sector of Ephesus' local economy. The well-preserved and studied city allows us to contextualize participation in the marble trade more vividly than elsewhere.

SARDIS

Geography and Historical Background

Sardis, 90 km east of Izmir, is nestled against the foothills of the Tmolus mountain range to the south and to the north is the fertile Hermes valley. It was the capital of the Anatolian kingdom of Lydia (Fig. 5.21). Lydian architecture, religion, and industry thrived within the confines of the mudbrick fortifications, which enclosed nearly 130 hectares. Sardis was a production center for ceramics, wool, agriculture, and most famously, metals. Gold occured in the form of electrum in the Pactolus River, and ancient sources credit Sardis as the birthplace of coinage.[476] The state's associations with these resources and trade brought great wealth to the Lydian kings and their city. The monumental tumulus tombs, situated outside the city in the low-lying plain near the Gygean lake, symbolized the wealth and cultural power of Lydia and served as the royal burial chambers for the last generation of Lydian kings.[477] Sardis became a satrapal

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[476] A. Ramage and P. Craddock, King Croesus' Gold: Excavations at Sardis and the History of Gold Refining (Cambridge, MA 2000).

[477] Regional survey has shown that in addition to the royal burials, tumulus groups also marked estates or the burials of high-status Lydian families. C. Roosevelt, The Archaeology of Lydia: From Gyges to Alexander (Cambridge 2008) 91-184.

capital in Anatolia in the Persian empire when it was sacked by the Persian king Cyrus the Great in 547 or 546 B.C. Situated at the western terminus of the Persian Royal Road, the city became a buffer to the Greek city-states to the west. During Achaemenid occupation, mixing between Lydian and Persian satraps, nobles, soldiers, traders, and craftsmen created a hybrid Iranian, Lydian, and Greek culture indicating an international culture and continued wealth. When the city surrendered peacefully to Alexander the Great in 334 B.C., it was given back its ancestral customs. Hellenistic Sardis functioned as a royal administrative center of the Seleucid kings, and while it reoriented itself into a traditional Greek *polis*, it remained ever mindful of its unique heritage.[478] The most visible symbol of this cultural transformation was the construction of an enormous extramural dipteral temple of Artemis in the early third century B.C., likely built over an ancient cult site dedicated to Artemis as in Ephesus.

Sardis was again subject to the changing tides of political power when it was incorporated into the Roman province of Asia in 133 B.C. Its urban infastructure reflected the socio-political institutions of the Roman Empire and in the first and second centuries A.D., a bath-gymnasium, stadium, and theater were constructed.[479] After a major earthquake struck in A.D. 17, emergency funds from the imperial treasury helped the city to be remade in a new fashion.[480]

Sardis rivaled the other important coastal cities of Asia Minor, proclaiming itself on the coins it minted "first metropolis of Greece, of Asia, of all Lydia." In comparison

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[478] For a discussion on when Sardis became a *polis*, see P. Gauthier, Nouvelles Inscriptions de Sardes II. Hautes Études du Monde Gréco-romaine 15 (Geneva 1989) and C. Ratté, "Reflections on the Urban Development of Hellenistic Sardis," in N. Cahill (ed.), Love for Lydia (Cambridge, MA 2008) 125-134.
[479] The theater may occupy the site of an earlier Hellenistic predecessor.
[480] Tacitus, Annales 2.47.

to other regional cities, it was probably slightly smaller than Pergamon with population between 50,000 and 100,000 people in the second to fourth centuries A.D.[481] While the decision of its most famous son, Celsus Polemeanus, the Roman Senator and first proconsul of Asia Minor, to be buried in Ephesus shows that he thought Ephesus a city superior to his own, Sardis flourished as a *conventus* and assize district throughout the Roman period. The bestowal of the prestigious title of *neokoros*, at least twice, and perhaps three times, continued the strong, religious identity always associated with the site.[482] An Ionic temple of an early Imperial date and the reconfiguration of the Artemis temple, replete with statues of Antoninus Pius, Faustina the Elder and Commodus, housed the cult worship of the emperor.[483] The sizeable Jewish population was served by an ornate synagogue, which was converted from one of the adjoining halls of the gymnasium in the fourth or fifth century A.D.[484] Sardis was also home to a dynamic Christian community, who worshiped in churches both inside and outside of the city walls, and was famed as having one of the "seven churches of Asia."[485] A commercial and residential center near the gymnasium also prospered into the sixth century A.D. before the area was abandoned in the following century and the population moved to the citadel in mid-seventh century A.D.[486] Sardis' maintained its population, albeit

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[481] G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge, MA 1983) 146.
[482] B. Burrell, Neokoroi: Greek Cities and Roman Emperors (Leiden 2004) 100-115.
[483] C. Ratté, T. Howe, and C. Foss, "An Early Imperial Pseudodipteral Temple at Sardis," American Journal of Archaeology 90.1 (1986) 45-68; H. Butler, Sardis 2, The Architecture, Part 1: The Temple of Artemis (Leiden 1925).
[484] D. Mitten, The Ancient Synagogue of Sardis (New York 1965); J. Magness "The Date of the Sardis Synagogue in Light of the Numismatic Evidence," American Journal of Archaeology 109 (2005) 443-475.
[485] S. Lightly (ed.), Good News Bible (Birmingham 1954) Revelations 3.1-6.
[486] J. Crawford, The Byzantine Shops at Sardis (Cambridge, MA 1990); M. Rautman, "A Late Roman Townhouse at Sardis," in E. Schwertheim (ed.), Forschungen in Lydien, Asia Minor Studien 17 (Bonn 1995) 49-66.

diminished, well into the Middle Ages, but was subject, like the rest of Asia Minor, to the conquering Seljuk, Byzantine, and Mongol empires.

The history of excavations, geographical and geological setting, and urban character of Roman Sardis contribute to fundamental differences in the material record in comparison to the other major Roman cities of Asia Minor. Sardis seems to have a diffuse urban layout rather than a single, gridded core as seen in many other regional cities of comparable size; colluvial erosion from the Tmolus mountains has deposited hundreds of thousands of cubic meters of earth on top of the ancient monuments, many of which remain hidden and unexcavated;[487] and excavations have focused in equal measure on the Lydian, Persian, Hellenistic, Roman, and Late Roman periods (Fig. 5.22). These factors have obscured what must have been a grander Roman city than is on view today.

Quarries at Sardis

Sardis, like other cities in the region, relied on a number of white marble resources.[488] Marble quarrying in the region dates as far back as the Chalcolithic period.[489] The main quarries of Sardis are located along the deeply cut Mağara Deresi, 2.8 km southwest of the Temple of Artemis, where extensive quarrying was carried out for 300 m along the east and west sides of the gorge. Medium to small-sized quarrying districts have been cut into the bedrock two to 30 m above the stream level (Figs. 5.23, 5.24, 5.25.). The topographic setting of the quarries on the steep gradient of the hillslope

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[487]G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge, MA 1983) 2-4.
[488] The quarries outside the immediate area of Sardis have not been systematically studied.
[489] A workshop near the village of Kulaksızlar specialized in the production of marble beakers, bowls, and figurines. T. Takaoğlu, A Chalcolithic Marble Workshop at Kulaksızlar in Western Anatolia: An Analysis of Production and Craft Specialization (Oxford 2005).

must have made the extraction of blocks difficult.[490] The Sardis quarries are unique in Asia Minor for their nearly complete state of preservation. Their isolation and difficult access has protected them from the destruction caused by modern quarrying seen in many other ancient quarries across the region. The marble is predominately coarse grain white with gray bandings, and weathers gray. I estimated that the volume of these quarries combined exceeds 20,000 m^3. This estimate was based on simple visual observations rather than on specific measurements. There are also substantial resources at higher elevations, which are visible from the quarry road, but I was not able to visit them (Fig. 5.26). As a result, it is fair to assume that the volume of stone removed from the quarries is in fact much higher than the estimate presented above.

Of special interest is a rock-cut relief in the quarries, which depicts an unknown god and goddess standing in a temple; the goddess is accompanied by a caduceus. A separate inscription, OPOC or "boundary," was quarried nearby onto the face of one of the quarries in the Late Roman period as indicated by the lunate sigma.[491] Perhaps the image of the godess and the boundary marker refer to a connection between the quarries and the temple of Artemis.

Substantial marble deposits were also exploited northwest of the Gygaean Lake in the hills near the villages of Gölmarmara and Değnekler; and several of these are

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[490] Teoman Yalcinkaya related to me that the *dere* ran as a perennial stream before it was tapped as a water supply for a nearby village. The area is now used as a water source for agricultural purposes and a local workman related that the water is nearly waist-deep during the winter months.

[491] G. Hanfmann and N. Ramage, Sculpture from Sardis: the Finds through 1975 (Cambridge, MA 1978) 126-127; C. Greenwalt and M. Rautman, "The Sardis Campaigns of 1994 and 1995," American Journal of Archaeology 102 (1998) 503.

subterranean.[492] One of the quarry faces near Gölmarmara preserves an etching of an arcade with voussoir blocks and an impost capital; the association of impost capitals with the Late Roman period may help to date its opening. In the Central Hermus river valley, a quarry is located near the village of Karaköy. A series of marble quarries line the eastern and northern sides of the middle Phrygius River valley, including one near the village of Harmandalı, which contains abandoned columns and blocks of a fine grain white marble, and another near the village of Rahmiye at the southern base of Karayunt Dağ.[493] In the Cogamus river valley, a tributary of the Hermus, a quarry was observed near the ancient site of Philadelphia at Badınca.[494] On the eastern fringes of Lydia, ancient quarries have been noted north of the village of Gölde, in the vicinity of Selbioğlu, and near Sivaslı.[495] A recent archaeological survey on the northern side of the Gediz plain has revealed a number of small white marble quarries.[496] At present, it is not known if these quarries served Sardis.

The geology of the marble resources around Sardis has not been studied systematically (Fig. 5.27). M. Ramage and R. Tykot carried out carbon and oxygen

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[492] I was not able to visit these quarries. G. Hanfmann and J. Waldbaum, A Survey of Sardis and the Major Monuments Outside the City Walls (Cambridge, MA 1975) 21 and N. Asgarı mentions the quarries near Gölmarmara in M. Mellink, "Archaeology in Asia Minor," American Journal of Archaeology 80.3 (1976) 284; C. Greenwalt and M. Rautman, "The Sardis Campaigns of 1994 and 1995," American Journal of Archaeology 102 (1998) 503.

[493] See R. Dinç, "Kulaksızlar Mermer Idol Atölyesi ve Çevre Araştırmaları," Araştırma Sonuçları Toplantısı 14 (1997) 265; C. Roosevelt, Lydian and Persian Period Settlement in Lydia, Ph.D. dissertation, Cornell University (Ithaca 2003), respectively.

[494] C. Greenwalt and M. Rautman, "The Sardis Campaigns of 1994 and 1995," American Journal of Archaeology 102 (1998) 503.

[495] See H. Bozkurt and N. Bayçın, "Manisa Tarihi Arkeoloji Araştırması," unpublished manuscript in the Manisa Museum (Manisa 1939); M. Mellink, "Archaeology in Asia Minor," American Journal of Archaeology 80 (1976); N. Asgarı, "Uşak Selçikler ve Çevresinden Roma Çağı Lahitleri ve Mermer Ocakları," Türk Arkeoloji Derğisi 25.2 (1981) 37-47, respectively.

[496] C. Roosevelt and C. Luke, "Central Lydian Archaeological Survey: 2006 Results" Araştırma Sonuçları Toplantısı 3 (Ankara 2008) 312.

isotopes on the Mağara Deresi and Gölmarmara quarries as part of C. Ratté's examination of the building materials used in the Lydian-era monuments.[497] The results show two distinct signatures for the quarries, particularly in the carbon values; this suggests that the two marble sources have different geological ages (Fig. 5.28). Additionally, samples taken from the Alyattes tomb chamber show yet another signature, strongly indicating that additional white marbles used in the Lydian period remain undiscovered. Less is known about the Sardis quarries than in other regional cities; this makes comparative interpretations difficult and less reliable.

Other Stone Resources

Limestone was as readily available as marble, and numerous sources have been identified in the immediate vicinity around Sardis and Bin Tepe for the construction of local monuments.[498] A honey colored alabaster with white and gray bandings was found alongside the white marble at Harmandalı between ancient Thyatira and Sardis.[499] A 90 m long and ten m high cut made into the hillside bears evidence of ancient exploitation, and a number of blocks and columns were abandoned there (Fig. 5.29). Stone *alabastra*, popular as eastern luxury items, have been found in many sixth to fourth century B.C.

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[497] M. Ramage and R. Tykot, "Appendix 4: Geological Analysis of Lydian Building Stones and their Quarry Sources," in C. Ratté, Lydian Architecture (Cambridge, MA 2011) 127-132.
[498] For information on the limestone sources, see C. Roosevelt, The Archaeology of Lydia from Gyges to Alexander (Cambridge 2009) 54-55; M. Ramage and R. Tykot, "Appendix 4: Geological Analysis of Lydian Building Stones and their Quarry Sources," in C. Ratté, Lydian Architecture (Cambridge, MA 2011) 127-133.
[499] M. Çolak and L. Lazzarini, "Quarries and Characterisation of a Hitherto Unknown Alabaster and Marble from Thyatira (Akhisar, Turkey)," L. Lazzarini (ed.), ASMOSIA VI (Venice 2000) 35-40.

Lydian funerary contexts.[500] The similaritiy of *alabastra* to the stone observed in the quarries suggests that Harmandalı was an important source for the procurement of alabaster beginning as early as the Lydian period. Local sources of alabaster may have also been used in the public buildings of Roman Sardis. Other stone resources exploited in the territory include chalcedony, jasper, onyx, serpentine, and emery.

Marble consumption at Sardis

Monumental stone architecture in the region dates as far back as the second millenium B.C.[501] Throughout the different phases of its history, Sardis exploited its resources in ways that were typical of marble-rich places. Large-scale quarrying of stone is associated with public or royal building projects and beginning in the sixth century B.C., marble was used in funerary architecture and for statuary. The 100 tons used in the chamber of Alyattes' tomb represents an exceptionally large amount of marble for the period.[502] A series of female figures, a crowned goddess and kore, and recumbent lions, the royal symbol of Lydia are the earliest attested sculptures carved in marble.[503] The diversity of building materials employed at Sardis in Lydian period – timber, mudbrick, terracotta, marble, limestone, sandstone, alabaster, and a variety of metals – reveals not only the richness of the surrounding landscape, but also the influence of foreign contacts. The imprint of Aegean and Near Eastern building techniques on the major Lydian

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[500] C. Roosevelt, "Stone Alabastra in Western Anatolia," in Y. Rowan and J. Ebeling (eds.), New Approaches to Old Stone (London 2008) 285-297.
[501] Recent survey work identified a network of fortified citadels near the Gygaean lake, C. Roosevelt, "Central Lydia Archaeological Survey: 2005, Results," Araştırma Sonuçlar Toplantısı 24.2 (2007) 135-154.
[502] R. Tykot and M. Ramage, "On the Importation of Monumental Marble to Sardis," in J. Herrmann, N. Herz, R. Newman (eds.), ASMOSIA V (London 2002).
[503] G. Hanfmann and N. Ramage, Sculpture from Sardis: The Finds through 1975 (Cambridge, MA 1978) and C. Ratté, "Five Lydian Felines," American Journal of Archaeology 93.3 (1989) 379-393.

construction projects is visible in both the choice of materials as well as in their design.[504] Sardis seems to have been an intermediary in technological diffusion in this period as a result of its royal status; the Lydian architects, who adopted Near Eastern methods for their local monumental architecture, in turn, transmitted them to East Greek builders, engaged in building *poleis* sanctuaries.[505] Crafting marble architecture and sculpture required specialized skills for procuring, carving, and transporting heavy stone, and it is unlikely that anyone other than the king or highly-placed elites had access to this technological expertise and the amount of money needed to carry these projects to fruition. Lydian royalty also sponsored marble temple-building outside of Sardis, at Assessos under Alyattes and at Ephesus under Croesos.

The use of marble in the Achaemenid period is limited to freestanding and architectural sculpture in temples and tombs. The sculpture, which includes depictions of women, animals, gods, and goddesses, and funerary scenes, displayed an amalgam of Lydian, Anatolia, Greek, and Achaemenid iconography and styles.[506] A series of anthemion stele crafted by local artisans trained in East Greek workshops, or Greek sculptors settled in Lydia show increasing influence from the west.[507]

The Hellenization of Sardis is reflected by the use of marble as the primary building material, typical of Hellenistic cities with local marble sources. Sardis was outfitted with several temples, a stadium, gymnasium, theater, prytaneion, and a handful

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[504] C. Ratté, Lydian Architecture (Cambridge, MA 2011).
[505] C. Ratté, "Lydian Contributions to Archaic East Greek Architecture," in J. Courtils and J. Moretti (eds.), Les Grandes Ateliers d'Architecture dans le Monde Egeen du VI^{e} Siecle av. J.-C. (Paris 1993) 1-12.
[506] E. Dusinberre, Aspects of Empire in Achaemenid Sardis (Cambridge 2003) 87-94.
[507] C. Ratté, "Anthemion Stelae from Sardis," American Journal of Archaeology 98 (1994) 593-607.

of other undiscovered buildings alluded to in epigraphic sources.[508] The Artemis temple, set against the dramatic backdrop of the Tmolus mountains, represents the largest building project of the Hellenistic period in the city, and the fourth largest Ionic temple in all of the Greek world. Construction took place under the context of Seleucid patronage, similar to the temple of Artemis in Ephesus. Built entirely of marble, it consumed the greatest amount of any building project ever associated with the city. Excavations subsequent to Butler's excavations during the 1920's under G. Hanfmann showed that in spite of three separate phases of construction (281 – 222 B.C., 222 B.C. – A.D. 17, and A.D. 17 – second century A.D.), the building was never fully finished in any of these periods.[509] The plans for construction of the temple likely precipitated the opening of the quarry series nestled in the ravine of Mağara Deresi.[510] Butler also noted the presence of a different type of marble – a bluish-white marble - originally used as part of a wall and reused in the porticoes as Greek inscriptions and as a cylindrical die of a pedestal for a statue base.[511] It is not inconceivable that several marble sources were used in the construction of the temple, given the large amounts required and that construction spanned three centuries. Recent scientific analyses on the marbles at the Temple of Apollo at Didyma, which experienced a similarly drawn-out building history, have shown that several, different local, and less securely, imported white marble sources were used in the late Hellenistic and Roman temple.[512] Rough estimates indicate that only the walls

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[508] G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge 1983) 115-118.
[509] G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge 1983) 119-120.
[510] The Hellenistic relief seems to confirm the opening date.
[511] H. Butler, Sardis Volume II, Architecture, Part 1, the Temple of Artemis (Leiden 1925) 106-108.
[512] These include several districts around Lake Bafa, Proconnesos, and Thasos. B. Borg and G. Borg, "The History of Apollo's Temple at Didyma, as Told by Marble Analyses and Historical Sources," in L. Lazzarini (ed.), ASMOSIA VI (Venice 2000) 271-279.

and columns of the Artemis temple consumed about 14,000 m^3 of marble.[513] This number reflects less than half of the volume of marble used in Hellenistic temple of Artemis at Ephesus and slightly below the lowest, and most conservative, estimate of the volume of marble removed from the Mağara Deresi quarries, which was likely the primary source of building material used in the temple's construction.

Stone-working at Sardis reached a pinnacle in both sheer volume and diversity of sources in the Roman period, and it was probably in this period that additional sources for white marble were targeted and opened in the surrouding countryside. The state of preservation of the Roman-period buildings at Sardis makes it difficult to comment extensively on the patterns of marble exploitation at Sardis. For example, the construction of the theater, which may have accomodated 12,000-15,000 spectators, a bouleterion, and stadium after the earthquake in A.D. 17 would have consumed substantial amounts of marble. There is little that can be said beyond this since these structures were quarried for building materials in the early twentieth century A.D.

Workshops specializing in the production of freestanding and relief sculpture, architectural carving, and sarcophagi were active at the site until the late sixth century A.D. Results from preliminary petrographic and X-ray diffraction analysis led the researchers to believe that of the approximately 130 sculptures excavated at the site from a number of contexts from the Hellenistic to Byzantine periods (including statues of men women, emperors, gods, mythological figures, as well as funerary and votive reliefs),

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[513] The exterior cella walls were 20 m high, 67.50 m long, and 3 m in width (8,100 m^3), and the interior walls 18.35 m in length (1,100 m^3) , and the 52 columns on the front and sides were 17.74 m high by 2.04 m in diameter (3,700 m^3), and the columns on interior porch, 15.54 m by 1.58 m (1,000 m^3). G. Gruben, "Beobachtungen zum Artemis-Tempel von Sardis," Mitteilungen des Deutschen Archäologischen Instituts, Athenische Abteilung 76 (1961) 155-196.

most were carved out of the locally available marble.[514] While the results of scientific analysis are consistent with the assumption that the marble was local, they do not provide conclusive evidence. Petrographic and trace element analysis was performed on a relatively limited sample size, including 11 samples from the Mağara Deresi quarries and 19 from sculptural objects found on-site. A green marble tree and a statuette, Egyptian in style, previously assumed to be imports, may have even been made of the green serpentine available in the territory.[515] Several exceptions include a fine-grained white and yellow marble; the source was tentatively identified as Parian or Pentellic, but this remains conjectural.[516] Further technical analysis on the sculpture and research on the territorial quarries may help to clarify their provenance.

In spite of the fact that Roman Sardis lies under two to three meters of colluvial debris, excavations of several buildings reveal a use of marble typical of other places in the Roman period. A building on the northern slopes of the acropolis, identified as an early Roman imperial pseudodipteral temple dedicated to the imperial cult, was primarily built from the local white marble.[517] The use of limestone in the structural foundations cut down on construction costs. Hidden from the naked eye, limestone was used in the piers and pavers under the marble stylobate, and in the portions of the stylobate that could be covered by marble plinths of the column bases. Recent excavations have hinted at the temple's original lavishness, underlining the fact that the dedication of a temple to the

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[514] G. Hanfmann and N. Ramage, Sculpture from Sardis: The Finds through 1975 (Cambridge 1978) 87-152.
[515] G. Hanfmann and N. Ramage, Sculpture from Sardis: The Finds through 1975 (Cambridge 1978) 6 and 113.
[516] See Catalogue Nos. 90, 94, 97, 98, 122, 125, 181 and 183 in G. Hanfmann and N. Ramage, Sculpture from Sardis: The Finds through 1975 (Cambridge 1978).
[517] C. Ratté, T. Howe, and C. Foss, "An Early Imperial Pseudodipteral Temple at Sardis," American Journal of Archaeology 90.1 (1986) 50.

imperial cult was a rare and prestigious honor for a provincial city.[518] Along with bronze, gold and marble statues, the walls of the temple were richly adorned with colorful marble revetment.[519] A trench opened in the northwest corner (Wadi B 05.1) uncovered fragments of red Bithynian, green Carystian, red Iasene, purple Dokimeion, and green Thessalian marbles, and an unidentified alabaster (Fig. 5.30).

The Bath-Gymnasium, positioned in the lower half of the city in the plain, represents the best-preserved building with marble imports in Sardis.[520] The Palaestra, used for outdoor exercise, was a large peristyle court surrounded by 100 marble columns, which enclosed an interior space of 64.60 m^2. The marble court, accessed through the palaestra, which consisted of a colonnade of ten double engaged columns with Corinthian capitals. An aedicular façade, composed of two stories of monolithic columns and elaborately carved entablatures with figural, composite capitals on the first-story, and oval Corinthian capitals on the second, marked the entrance to the bath block.[521] While there is no building inscription, attesting the original building date or the names of the donors, a statue base for the Emperor Lucius Verus, found in *situ* in the south apse of the bath block (BSH), provides evidence that the Bath Block was completed around A.D. 161-169, and a Severan inscription, carved on the first story architrave of the Marble

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[518] B. Burrell, Neokoroi: Greek Cities and Roman Emperors (Leiden 2004). For the location of the trench, see C. Greenwalt, "Sardis: Archaeological Research and Conservation Projects in 2005," Kazı Sonuçları Toplantısı 28.2 (2006) 744.

[519] Fragments of bronze (some of which was gilded, including a lion's paw and mane) and marble (a male figure) statuary are recorded in, C. Ratté, T. Howe, and C. Foss, "An Early Imperial Pseudodipteral Temple at Sardis," American Journal of Archaeology 90.1 (1986) 49-50.

[520] Archaeological fieldwork was undertaken from 1958-1974, and a section of the building, the Marble Court, was reconstructed to recapture its original grandeur and reveal its technical design and intricacies. The main archaeological and architectural reports are: G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge 1983) 148-161 and F. Yegül, The Bath-Gymnasium Complex at Sardis (Cambridge 1986).

[521] N. Hirschland, "The Head-capitals of Sardis," Papers of the British School at Rome XXXV (1967) 12-22.

Court, may commemorate the completion of the Court around A.D. 211-212.[522] The construction of the palaestra colonnade was the last part of the building to be fully finished, and this occurred at some point in the third century A.D. Several other inscriptions suggest a major restoration of the bath block in the late fourth to fifth century A.D.

The basic building materials of the inner structural supports - lime, brick, timber, metals, stone - were presumably drawn primarily from local environs. The core of the building was hidden by a shell of white and imported colored marbles. The architectural elements in the bath block and palaestra (capitals, architraves, friezes, cornices, bases), was carved out of white marble from the local quarries, and the colored wall revetment was imported from various sources across the Empire. The northeastern and southeastern corners of the peristyle court preserves colored monolithic columns from Bithynia, Carystos, and Dokimeion.[523] The screen colonnade in the entrance from the Palaestra to the Marble Court was composed of purple monolithic columns from Dokimeion. The colonnade continued with a row of four red monolithic columns from Bithynia, separating the palaestra from the main bath block. Four spiral fluted yellow monolithic columns from Numidia stood on either side of the central apse on both stories of the aedicular façade (Fig. 5.31). Purple monolithic columns from Dokimeion adorned the northwest and southwest corners of the second story façade (Fig. 5.32).

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[522] F. Yegül, The Bath-Gymnasium Complex at Sardis (Cambridge 1986) 11-16.
[523] Ward-Perkins was in fact the first person to note the presence of the columns from Dokimeion in the Bath-Gymnasium Complex. H. Dodge and B. Ward-Perkins, Marble in Antiquity. Collected Papers of J.B. Ward-Perkins. Archaeological Monographs of the British School at Rome 6 (London 1992) 67, footnote 27.

The *frigidarium*, the architectural focal point of the building, preserves holes for clamps and dowels on the wall surfaces. Analysis of revetment piles excavated from the marble hall includes at least 18 different varieties of imported stone that covered the interior surfaces of the bath block. These include marbles from Bithynia, Carystos, Chalcidicum, Chios, Dokimeion, Hierapolis, Lacedaemonia, Mons Porphyrites, Numidia, Proconnesos, Teos, and Thessaly, as well as local alabasters, and a green sandstone.[524] The back of a piece of purple revement from Dokimeion bears an inscription (IN 71.13) from the accounting and leasing system relating to the adminstration at the quarries:

/O CVII
/PROC

As described in chapter four, the term PROC often appears on blocks intended for export, and refers to the *procurators* attested in supervisory roles at Dokimeion, Chemtou, and a number of the Egyptian Eastern Desert quarries.[525] The Roman numeral, CVII, could refer either to the consular year, the branch from which the block was extracted, or the annual serial number.[526] This piece of evidence is similar to the labelled Dokimeion revetment found in Terrace House Two at Ephesus, and taken together, it is possible to envision a scenario in which civic builders had direct access to materials sold from the state-run quarries. The marble could have been bought directly from imperial agents or indirectly from private contractors. Whatever the case, logic suggests that the marble went directly from the Dokimeion quarries to Sardis' Bath-Gymnasium.

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[524] This includes revetment collected from the excavations in 1958 and 1959 of Building B, which would later be identified as the Bath-Gymnasium complex.
[525] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – A.D. 235 (Oxford 2010) 113-114.
[526] C. Fant, Cavum Antrum Phrygiae: The organization and operations of the Roman Imperial marble Quarries in Phrygia, British Archaeological Reports 482 (Oxford 1989) 17-28.

Polychrome marbles came from a wide range of sources, and represent types commonly distributed throughout the Roman empire. The importation of the monolithic columns used in the Marble Court and Palaestra required extra organizational effort given the logistical issues of transportation, cost, and the architect's timetable for building. The use of yellow monolithic columns from Numidia was relatively rare in Asia Minor. An inscription from the Symrna agora describes how Hadrian gave the city a set of 20 Numidian columns (along with the title of neokorate and other types of marbles and gifts).[527] In imperial baths in Rome, and at cities elsewhere in the Empire, the fashion for designing public baths was colorful architectural adornment complemented by bronze and marble statuary programs.

In the third century A.D., Diocletian raised Sardis' rank to that of a provincial capital. During the Late Roman period, new building occurred along lines of urbanization seen elsewhere in the east; the city was fortified with a wall that enclosed four km and church-building, better attested in the epigraphic than archaeological record, reflected the Christianization of the city The area along the main east-west road, adjacent to the Bath-Gymnasium, became the commercial, religious and residential heart of the city. The district seems to have grown organically without strict enforcement from governmental imperial or municipal bodies as indicated by the encroachment of privately-owned spaces upon public buildings. Older buildings in the vicinity, such as the the Bath-Gymnasium, required constant upkeep and maintenance, and either functioned as they were originally intended or were entirely repurposed to suit different

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[527] IGR IV 1431 = I. Smyrna no. 697.

needs.[528] Rooms flanking the south side of the Palaestra were converted into a synagogue with an apse, a nave, two side-aisles and a forecourt at some point in the fourth to sixth century A.D., revealing a wealthy and influential Jewish community.[529] The colonnaded Marble road, the main east-west artery of the city, was repaved with cobblestones in the time of Constans II, replacing an earlier Roman colonnaded road.[530]

The building materials used in these architectural reconfigurations were more often than not, reused, although this is often difficult to say with precision. The use of architectural and sculptural marble *spolia* in Late Roman and Early Byzantine buildings is ubiquitious at Sardis and across the Roman Empire, and seems to be a deliberate, fashionable, and ultimately, economical choice. The 'marble style' continued along the lines of earlier architectural traditions, but on a much-reduced scale. Some of this marble *spolia* was hidden from view, such as the gray granite columns from Mysia (Fig. 5.33) and Persian-period votive reliefs built into the south wall of the synagogue, yet much of it was plainly visible. Patrons, architects and builders consciously reappropriated materials as expressions of ties to the past. A pair of Lydian-era lions was installed outside the Synagogue's Forecourt as symbols of the Jewish community's connections to Sardis'

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[528] Inscriptions found in the Bath-Gymnasium Complex explicity refer to renovation projects undertaken in the fourth or fifth centuries, F. Yegül, The Bath-Gymnasium Complex at Sardis (Cambridge 1986) 12-16, newly carved impost capitals, F. Yegül, "Early Byzantine Capitals from Sardis: A Study on the Ionic Impost Type," Dumbarton Oaks 28 (1974) 265-274, and archaeological evidence for reconfiguration testifies to architectural reorganization of the building.

[529] G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge 1983) 168-190; D. Mitten, The Ancient Synagogue of Sardis (New York 1965); for recent controversies on the dating, see J. Magness "The Date of the Sardis Synagogue in Light of the Numismatic Evidence," American Journal of Archaeology 109 (2005) 443-475.

[530] Remarkably, the modern road remains in nearly the same position today as the Persian Royal Road, which ran from the Aegean to Iran. The south side of the colonnade is still buried under the modern highway. For the Late Roman period, see J. Crawford, The Byzantine Shops at Sardis. Archaeological Exploration of Sardis Monograph 9 (Cambridge 1990) 3-5.

famous legacy as the seat of a powerful kingdom in the period, and to their arrival in Sardis as refugees after Seleucid resettlement.

Reacquistioned materials were often displayed in prominent positions, and the use (and reuse) of colorful imported marbles was particularly common. Two pedimented shrines in the main hall of the Synagogue each incorporated a set of Proconnesian and Mons Porphyrites columns (Fig. 5.34). The walls of the main hall were adorned with elaborate geometric and vegetal colored marble inlays.[531] That seven of the 18 types of marble revement (red and yellow Bithynian, green Carystian, purple Dokimeion, yellow Numidia, and green Thessalian as well as the local alabaster) indicates that decoration for the Synagogue drew heavily from materials originally used in the Bath-Gymnasium Complex (Fig. 5.35).

The taste for decorating with colored monolithic columns also continued as seen in the Late Roman colonnades that lined the outside of the Bath-Gymnasium on the east, south, and west sides. The East colonnade, whose monumental gate served as the main east entrance to the Palaestra, has variously been identified as the main north/south thoroughfare in the city (East Road) or as a square that faced the formal entryway into the Palaestra.[532] The columns of the east colonnade were composed entirely of colored monolithic columns from Bithynia, Carystos, Mysia, and Numidia.

The south colonnade, which ran the entire length of the Bath-Gymnasium, provided people with shelter from the street traffic and the sun, as well as sidewalk

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[531] G. Hanfmann and L. Majewski, "The Ninth Campaign at Sardis (1966)," Bulletin of the American Schools of Oriental Research 187 (1967) 32-50.
[532] F. Yegül, The Bath-Gymnasium Complex at Sardis (Cambridge 1986) 17-23.

entrances to a row of shops, dated to the Byzantine period.[533] The colonnade was subject to at least three phases of renovations; the earliest was a monumental colonnade much larger than the others.[534] The columns of red marble from Bithynia and Iasos, and alabaster from Hierapolis, and an unknown green stone associated with the last phase have been cut down to half of their original height (Fig. 5.36). The irregularities of the orders and dimensions of individial capitals, pedestals, bases, and columns show that the colonnade was rebuilt using separate pieces from earlier buildings.

Wealthy, local property owners remodelled former urban spaces into large personal residences. A series of sprawling urban townhouses (Sector MMS) were situated in the district north of the Bath-Gymnasium, synagogue, and Byzantine shops.[535] A townhouse built in the fifth and sixth centuries A.D. contains a number of rooms and hallways of which the most striking were two semi-circular, apsed rooms (6,14), decorated with frecoes; the painting scheme imitates marble opus sectile. Room six displays a tripartite organization with a low painted socle (with alternating faux-marble panels), a central zone with elaborately decorated rectangular panels, and an upper register (also with alternating faux-marble panels). Painted pilasters separate the rectangular panels, which on the exterior, are framed with thin painted bands, and on the interior, are variously decorated with geometric patterns or single-colored panels. A number of other private residences show that the trend of imitating marble revement in painting was common at Sardis: the large room (3) and the apsidal room (14) of the

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[533] J. Crawford, The Byzantine Shops at Sardis. Archaeological Exploration of Sardis Monograph 9 (Cambridge 1990).
[534] G. Hanfmann, Sardis from Prehistoric to Roman Times (Cambridge 1983) 161- 163; F. Yegül, The Bath-Gymnasium Complex at Sardis (Cambridge 1986) 17-19.
[535] M. Rautman, "A Late Roman Townhouse at Sardis," in E. Schwertheim (ed.), Asia Minor Studien 17 (Bonn 1995) 49-66.

adjoining residence; fragmentary painted panels imitate yellow marble from Numidia and the yellow and red breccias from Bithynia in the reception room (D) of the townhouse at MMS/S (Fig. 5.37); the colors on the wall of a house discovered in Sector F55 (next to the Wadi B Temple) are suggestive of the red marbles from Iasos, yellow from Numidia, and green from Thessaly.[536] Archaeological and literary sources testify to the elaborately decorated apsed rooms as a setting for public receptions dinners, but they were also probably used for a variety of purposes. Round tables, the so-called sigma tables, have been excavated in houses at Sardis, and elsewhere throughout the Mediterranean, and may reveal Late Roman dining customs.[537] Two of these tables [Room X (MMS) and Room D (MMS/S)] were made from an unidentified, imported blue and white marble. What is most striking about the marble revement paintings at Sardis is that the artists, presumably local, drew inspiration from their immediate surroundings, and imitated only the range of colored marbles on display in the city's public buildings.

At Sardis, marble-working traditions were maintained for over a millenium. Beginning in the seventh century B.C., technological innovations in monumental stone architecture were fostered as a result of Lydian royal largesse. Sardis' unique position as a powerful kingdom meant that it both absorbed and diffused stone-building techniques learned from the ancient Near East kingdoms and the Greek city-states; and the acquisition of materials was fundamental to its emergence. Even after subjugation to

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[536] Illusory architectural-styled wall painting depicting marble opus sectile drew on a tradition dating back to the Hellenistic period and continued for centuries; the best examples are displayed in the private houses at Pompeii, Ostia, and Rome. J. Ward-Perkins, Roman Architecture (New York 1977) 108 and 140; S. Ellis, "Power, Architecture, and Décor: How the Late Roman Aristocrat Appeared to His Guests," in E. Gazda (ed.), Roman Art in the Private Sphere (Ann Arbor 1991) 117-134; M. Rautman, "A Late Roman Townhouse at Sardis," in E. Schwertheim (ed.), Asia Minor Studien 17 (Bonn 1995) 155, cf. 28.

[537] For a recent catalogue of marble tables, see G. Roux, "Tables Chrétiennes en Marbre Découvertes à Salamine," Salamine de Chypre 4 (1973) 133-196.

Persian, Hellenistic, and Roman kings, generals and emperors, this knowledge was never lost.

In the Greco-Roman period, Sardis relied on its locally available white to greyish marble for the majority of its architecture and sculpture; and the size of the quarries indicates that the marbles were not traded, but exploited solely for civic adornment. Like other cities, the quarries closest to Sardis (Mağara Deresi) were not sufficient to meet the demands for white marble needed for civic construction, and other sources, which were further away from the city, had to be opened. Sardis also follows the pattern of other regional cities in which specialty, colored stones were targeted. Alabaster from Harmandalı has been identified in Lydian funerary *alabastra* and tentatively in the architectural decoration of the pseudodipteral temple, the Bath-Gymnasium Complex, and the Synagogue. Local exploitation saved the city the expense of importing alabaster from more distant sources, such as those from Hierapolis or from along the Egyptian Nile river valley, and allowed the city to engage in larger cultural trends.

As a medium-sized city situated along a major trade route, Sardis participated in the regional marble culture to a considerable degree by importing international colored stones for architectural adornment in a number of buildings. The majority of imported marbles come from the Asia Minor quarries (11 total), although Greek (6) and North African/Egyptian (2) quarries also supplied the city; the most common types were varieties of red from Bithynia, green from Carystos, and yellow from Numidia. Proximity to sources explains much of the architect and builder's rationale behind the selection of specific marbles. Even so, material from Bithynia, the most widely dispersed type throughout the city, and Dokimeion had to be transported overland for 250 km,

along an unidentified east-west road that eventually intersected with the major north/south route that ran through Prusa, Stratonicaea, Hadrianopolis, Thyrateira, and Sardis.[538] Marbles from Dokimeion were transported along the east-west route from Apameia, and then along the Hermus river valley's main route, which began at Laodicea ad Lycum and continued northwest to Hierapolis and Tripolis ad Maeandrum, before reaching Sardis. The expense of transporting these marbles overland probably would not have rivaled the expense of shipping monolithic columns from Carystos and Numidia for the Bath-Gymnasium first, by sea, and second, by land, for 90 km. Yet the uniformity of the types of marbles brought in for different building projects show that trading relationships, established and cemented over time, also influenced procurement decisions. The reuse of colored marbles in public buildings for many centuries indicates that their value was retained, and even increased, over time.

CONCLUSION

Quarrying on a large-scale began at Ephesus and Sardis in the seventh century B.C., and was tied to the benefactions of the Lydian kings for the construction of temples and royal tombs. The first major investment in marble quarrying at Ephesus was funded by Croesos for the construction of the temple of Artemis, and at Sardis, 100 tons of marble were quarried for Alyattes' tumulus chamber. In environments where mudbrick, timber, and terracotta were the easiest building materials to obtain and manufacture, the

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[538] Barrington Atlas of the Greek and Roman World (Princeton 2000) 52 and 56. The Bithynian breccias may have also reached Sardis by combination of sea (across the Propontis from Nicomedia and down the Aegean) and land routes (and then hauled 90 km inland along the main coastal route from Smyrna).

procurement of marble represented a greater investment of time, labor and money; it was at this time that prestige and marble-building became synonymous in the region. In the Hellenistic period, marble was used more extensively for public and funerary monuments and for the most part, marble sources were opened up in close proximity to construction sites. Ephesus also seems to have emerged as a regional marble-carving center. A local source of white marble may have been exported regionally to marble-poor Pergamon for the construction of the temple of Dionysos, and artisans specializing in marble and bronze statuary production advertised their Ephesian origins while working on commissions away from home.

In the Roman period, a number of new marble quarries were opened up further afield in the countryside to keep up with the demands of civic construction. Exploitation primarily targeted white marbles, but a number of specialty sources were opened as well, such as the black and streaky blue and white marble, known as *greco scritto*, at Ephesus and the alabaster sources in the territory of Sardis. Over 50 different quarrying sites, some of which were quite large, have been identified around Ephesus and nearly a dozen in the territory of Sardis. There is no evidence that Sardis ever supplied marble beyond its territorial limits. At Ephesus, however, it seems that local colored sources, fully-finished marble goods, and perhaps craftsmen circulated in regional and international networks and profited from the trade in local marbles – albeit to a limited degree. The export of both marble and marble-workers from Ephesus was exceptional. This was made possible by established marble-carving traditions, a large workforce, a wealthy population, and its advantageous position as an adminstrative and harbor city equipped with the personnel and infrastructure ready to import and export marble.

As at Aphrodisias, the rich marble resources within Ephesus and Sardis' territory largely served local needs. Yet these two Aegean cities, who both shared important distinctions as *conventus* centers and as being three times *neokoros*, had greater access to internationally-traded marbles. In order to make fruitful statements about their participation in the marble trade, it should be said that the state of preservation at Ephesus allows for greater contextualization than at Sardis where the evidence is patchier. At Sardis, only one large building with marble imports, the Bath-Gymnasium, has been fully excavated and studied; comparison between marble use in a similar type of building may be illuminative. The Harbor-Bath complex at Ephesus - built on a similar scale as the Bath-Gymnasium complex at Sardis, but nearly a generation earlier - displays commensurate amounts of marble imports. In the Bath-Gymnasium at Sardis, four different types of imported monolithic columns and 18 different types of imported revetment were employed throughout the building; in the Harbor-Baths at Ephesus, four different types of imported monolithic columns, one imported base, and at least nine types of marble revetment were employed. Comparison between the well-preserved bath-gymnasia shows that differences in marble consumption in public buildings of the two cities were not particularly perceptible. Comparisons between private residences, however, indicate that at Ephesus, wealthy aristocrats had more income at their disposal to decorate their houses with expensive marbles. G. Aptus, priest of Dionysos and his son, a Roman consul in A.D. 275, adorned their semi-private apartment with 30 different types of imported marbles, whereas the residents of the smaller, fifth century A.D. townhouse at Sardis could only afford painted reproductions of imported marbles. The archaeological record, however uneven, may present a representative sample. At

Ephesus, imports were used for a wider range of products in more buildings, and more marbles were transported from greater distances whereas the inland topography of Sardis curtailed access to more regional sources; all of this suggests that the major factor in distribution of marble was the high cost of transport. In addition to its coastal location, the larger and richer population of Ephesus translated to a higher proportion of well-placed elites with greater access to luxury goods; as illustrated with the example of Cicero and Atticus at the beginning of this chapter, this surely affected the consumption patterns reflected in archaeological record. To examine trade networks in Asia Minor further, the next chapter turns to Pisidian Antioch and Sagalassos, two interior cities without marble resources of their own.

CHAPTER 6

SAGALASSOS AND PISIDIAN ANTIOCH: THE MONUMENTALIZATION OF MARBLE POOR CITIES

This chapter analyzes stone consumption habits of two cities located in Pisidia: Sagalassos and Pisidian Antioch. Both cities were located in marble-poor zones and relied primarily on locally available limestone sources. As a result, it is possible to highlight trends otherwise invisible in cities with local marble resources. As with the analyses of the marble-rich cities in the preceding chapter, I will focus on the origins and types of marble imports, but will also consider the relationship between locally available materials and artisanal traditions and the context of the marble imports within these artistic environments. By categorizing the types of objects by building material (marble, limestone, both), it will be possible to understand why certain materials were produced and imported in marble instead of in the regional limestones. For example, were marbles imported as luxury items as tokens of prestige and wealth as elsewhere or were they imported because the local workshops lacked the technical expertise to produce them?

SAGALASSOS

Geographic Setting and Historical Background

Sagalassos is located in the ancient province of Pisidia and in the rugged terrain of the Tarsus mountains, bounded by the central Anatolian plain to the north and the Mediterranean sea 110 km to the south (Fig. 6.1). Like other regional settlements, Sagalassos was a mountaintop fortress, perched on a series of terraces on a steep slope between 1400 and 1600 m above sea level. Fierce resistance mounted by the locals repelled Alexander the Great for some time before he eventually sacked the city. Historical sources say that the city was a regional center by the Hellenistic period, and archaeological excavations have revealed a number of Hellenistic public buildings.

The greatest period of urban expansion, however, occurred during Roman rule. The *Pax Romana*, the creation of the *Via Sebaste*, and the foundation of veteran colonies nearby linked the city with the wider cultural and economic networks of the Roman Empire. Hadrian named Sagalassos as the "first city of Pisidia" when it became the center of the imperial cult. Recent research has suggested that another source of income may have come from industrial ceramic production; the table ware known as "Sagalassos red slip ware" was traded throughout the Eastern Mediterranean.[539] Growing prosperity allowed civic elites to fund lavish municipal buildings erected to glorify the city's past, the gods, the Roman emperor, the local ruling class, and the people.[540] At its height,

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[539] J. Poblome, Sagalassos Red Slip Ware. Typology and Chronology. Studies in Eastern Mediterranean Archaeology 2 (Turnhout 1999).
[540] M. Waelkens, "The Transformation of the Public and Sacred Landscapes in Early Imperial Sagalassos," in C. Berns (ed.), Patris und Imperium (Leuven 2002) 63-75.

Sagalassos could boast monumental colonnaded streets, three nymphaea, four temples, two agoras, a heroon, a macellum, a bath-complex, a theater, a bouleterion, an odeion; in later periods, fortifications and several churches were built (Fig. 6.2). This sophisticated urban armature was remarkable for a city of its size. With a population inside the city walls of around 3,000 people,[541] Sagalassos remained a rural and remote city until it gained some administrative importance as the seat of a Bishopric in the fourth century A.D.

Quarries and Carving Traditions at Sagalassos

Several projects have documented the locations of ancient quarries in Sagalassos' territory, reported on the exploitation, importation, and consumption of various types of stone, and undertaken chemical analyses of building stones; as a result, the stone used in buildings within the city have been matched to their quarry sources in great detail.[542] Additionally, L. Vandeput has researched the architectural carvings in the civic buildings and S. Mägele has examined the corpus of marble statuary excavated from Sagalassos.[543] As a result, the interdisciplinary research undertaken by the Sagalasssos Research Project

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[541] F. Martens, "The Archaeological Urban Survey of Sagalassos: The Possibilities and Limitations of Surveying a Non-typical Classical Site," Oxford Journal of Archaeology 24.3 (2005) 247-248.
[542] L. Moens, P. De Paepe, and M. Waelkens, "An Archaeometric Study of the Provenance of White Marble Sculptures from an Augustan Heroon and a Middle Antonine Nymphaeum at Sagalassos," in M. Waelkens and J. Poblome (eds.), Sagalassos IV (Leuven 1997) 367-384; M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 370-380; P. Degryse, P. Muchez, L. Loots, L. Vandeput, and M. Waelkens, "The Building Stones of Roman Sagalassos (SW Turkey): Facies Analysis and Provenance," Facies 48 (Erlangen 2003) 9-22; P. Degryse, T. Heldal, E. Bloxam, P. Storemyr, M. Waelkens, E. Trough, H. Vanhaverbeke, J. Poblome, and P. Muchez, "The Sagalassos Quarry Landscape: Bringing Quarries in Context," Quarry Scapes Project: Ancient Stone Quarry Landscapes in the Eastern Mediterranean (2007).
[543] L. Vandeput, The Architectural Decoration in Roman Asia Minor: Sagalassos: A Case Study (Turnhout 1997); S. Mägele, "The Sculptural Evidence of Sagalassos in its Urban Context," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor (Ann Arbor 2011) 319-335.

under the Catholic University at Leuven has provided some of the most extensive studies on these topics in Asia Minor. With this evidence at hand, the remainder of this section reviews the consumptive patterns of a small, marble-poor city under Roman rule.

Sagalassos lies at a convergence of three major Anatolian geologic units, the Antalya nappes to the south, the Lycian nappes to the west and the Isparta angle to the east.[544] Like the rest of southern Anatolia, there are no marble deposits in the ancient territory of Sagalassos. Limestones, conglomerates, breccias, travertine, volcanic tuff deposits were extensively exploited; limestone was the main building stone used within the city.[545] Limestone quarries located within the city and one km to the east, south, northwest were opened during the Hellenistic and Roman periods (Fig. 6.3). A larger series of quarries lay within ten km of the city. They furnished beige, pink, and yellow limestones along with smaller quantities of travertine and volcanic tuffs; a beige limestone from a quarry five km from the city was a particularly sought-after building material. The source located farthest away was a quarry with a white crystalline limestone, located 50 km west of Sagalassos, and it appears in civic buildings from the Trajanic period onwards.

The exact mechanisms in place for supplying local stones to Sagalassos are not clearly understood. The practice of obtaining building materials from quarries inside the city seems to have stopped in the Hellenistic period, likely because the monuments were

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[544] A. Robertson, "Mesozoic-Tertiary Sedimentary and Tectonic Evolution of Neotethyan Carbonate Platforms, Margins and Small Ocean Basins in the Antalya Complex, Southwest Turkey," in L. Frostick and R. Steel (eds.), Tectonic Controls and Signatures in Sedimentary Successions (Oxford 1993) 415-465.
[545] For detailed descriptions of individual quarry sites, see P. Degryse, T. Heldal, E. Bloxam, P. Storemyr, M. Waelkens, E. Trough, H. Vanhaverbeke, J. Poblome, and P. Muchez,, "The Sagalassos Quarry Landscape: Bringing Quarries in Context," Quarry Scapes Project: Ancient Stone Quarry Landscapes in the Eastern Mediterranean

built over, and by the Roman period, the architects and builders of Sagalassos had a range of options from which to chose. The opening of new quarries at some distance from the city indicates that the aesthetic and structural qualities of stone became more of a factor in their selection, overriding the increase in the costs of transportation.[546] The use of the high quality white limestone for decorative architectural elements in various buildings from the Trajanic period onwards makes it clear that the white limestone was chosen specifically for its suitability for architectural carving. Although there is no epigraphic evidence for quarry ownership and organization, the patterns of quarries in the landscape at Sagalassos seem to follow those of other regional cities. Stone procurement was affected by such factors invisible on the archaeological record as land-ownership, the lifespan of individual quarries, and the amounts of funding available for specific building projects.

The abundance of local limestone sources led to the development of a thriving local limestone carving tradition that began with the adornment of the city in the Hellenistic period. Vandeput's detailed study of the architectural decoration of the civic buildings traces the development of individual motifs throughout the city and compares them to other regional centers in Asia Minor.[547] She argued that it was possible to distinguish between local, regional, and foreign workshops active at Sagalassos by assuming that similarities in ornamental forms found elsewhere revealed the identity of the workshops. The appearance of distinctive features in the treatment of architectural

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[546] P. Degryse, P. Muchez, L. Loots, L. Vandeput, and M. Waelkens, "The Building Stones of Roman Sagalassos (SW Turkey): Facies Analysis and Provenance," Facies 48 (Erlangen 2003) 20-21.
[547] L. Vandeput, The Architectural Decoration in Roman Asia Minor: Sagalassos: A Case Study (Turnhout 1997).

motifs and the consistency of repeated patterns reflected local traditions carried out by the locally trained stone carvers responsible for executing Sagalassos' major building programs. The presence of Pamphylian and Dokimeion workshops was also discerned on the basis of comparative evidence.[548] These activities occurred during a period of intensive urbanization (A.D. 138-192), and may indicate that the local workshops did not have enough manpower to complete a number of simultaneously ongoing building projects.

Marble consumption at Sagalassos

Sagalassos' participation in the marble trade began as early as the Augustan period and continued through the Severan era.[549] The imports consisted primarily of marble statuary, columns, and wall veneer. The first known use of marble within the city was in the Northwest heroon, which housed a colossal-sized statue of a young man; the marble has been identified as Dokimeion on the basis of isotopic analysis, and the statue was apparently carved during the reign of Augustus (Fig. 6.4).[550] The second is a colossal foot attached to an inscribed statue base naming a M. Lollius at the beginning of the first century A.D., indicating that the practice of importing honorific statues was not

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[548] L. Vandeput, The Architectural Decoration in Roman Asia Minor: Sagalassos: A Case Study (Turnhout 1997) 187.
[549] Marble consumption at Sagalassos is outlined in detail in M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 370-380.
[550] L. Moens, P. De Paepe, and M. Waelkens, "An Archaeometric Study of the Provenance of White Marble Sculptures from an Augustan Heroon and a Middle Antonine Nymphaeum at Sagalassos," in M. Waelkens and J. Poblome (eds.), Sagalassos IV (Leuven 1997) 379.

uncommon.[551] The third is a fragment of onyx wall veneer, which is identified as coming from Hierapolis, and which decorated a small fountain east of the Northwest heroon.

The largest amounts of marble were imported to Sagalassos during the second century A.D., the century in which the city's most extensive urban building programs took place. An inscription relates that the Temple of Apollo Klarios was outfitted with marble veneer during its rebuilding in the Trajanic period. The Neon Library, which was built around A.D. 120 and underwent repair in around A.D. 200 and A.D. 375, made extensive use of Dokimeion veneer in the statue niches of the north wall. Monolithic blue and white columns from Dokimeion adorned the porticoes of the mid-second century A.D. *macellum*. Re-used granite monolithic columns from the Troad were found in the basilica west of the city and in the nymphaeum in the lower agora.

The Bath complex consumed the largest amount of marble of any building at the city.[552] Initiated under the reign of Hadrian, it was dedicated to the co-emperors Marcus Aurelius and Lucius Verus when it was completed four years into their reign in A.D. 165. A luxurious marble sculptural program promoted the dynastic succession of the Antonine family, and excavations have revealed the fragments of colossal statues of Hadrian, Sabina, Antoninus Pius, Faustina the Elder, and Marcus Aurelius that adorned the *frigidarium* (Fig. 6.5).[553] The entire statuary program was executed in Dokimeion white marble as confirmed by isotopic analysis. The walls and floors of the *apodyterium*, the

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[551] S. Mägele, "The Sculptural Evidence of Sagalassos in its Urban Context," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor (Ann Arbor 2011) 323-324.
[552] M. Corremans, P. Degryse, D. Wielgosz and M. Waelkens, "The Import and the Use of White Marble and Coloured Stone for Wall and Floor Revetment at Sagalassos," in ASMOSIA IX, Tarragona, Spain, June 2009.
[553] http://www.sagalassos.be/en/finds/2008/marcus_aurelius; http://www.sagalassos.be/en/finds/2008/faustina; http://www.sagalassos.be/en/finds/2007/hadrian.

frigidarium, and the two *caldaria* were adorned with marble revetment and decorative architecture imported from various locations in the Eastern Mediterranean; excavations within the complex have yielded over 80 tons of marble revetment (Fig. 6.6). The white, blue, yellow, and purple Dokimeion marbles represented the largest portion of imported veneer. Other marbles from Asia Minor include imported stones from Bithynia, Chios, Ephesus, Hierapolis, Iasos, and Lesbos. Types from the Eastern Mediterranean include the red, white and purple breccia from Scyros, the red marble from Taenaros, the green marbles from Carystos, Thessaly, as well as a green porphyry from near Sparta and another green porphyry of unknown origin, and the purple porphyry from Mons Porphyrites. The southern rooms of the baths were also adorned with green monolithic columns from Thessaly.

The lower agora relied heavily on marble imports for decoration. Two porticoes and a one-story aedicular nymphaeum were built in the Hadrianic period; in the Severan period, the original nymphaeum was dismantled and a new one, identical to the former, was erected 0.4 m in front of it to accommodate a staircase connecting the upper and lower agoras. The building contained a number of marble architectural elements; blue and white columns from Dokimeion and Troad granite columns were found lying in the rooms of the eastern and western porticoes, and white marble bases of unknown origin were found *in situ* in the Severan phase of the nymphaeum. Eight niches provided space for the display of sculpture in both phases.[554] Of the Severan assemblage, fragments of four Nike statues survive. An over-lifesize statue of a Hera similar to types found at

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[554] S. Mägele, "The Sculptural Evidence of Sagalassos in its Urban Context," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor (Ann Arbor 2011) 328-331.

Ephesus (Fig. 6.7), and a statue of Tyche, both of early Hadrianic date, may have originally adorned the bath complex. The origins of the marble have not been securely identified as scientific testing has not been carried out. However, the stylistic similarities between the Hera and Tyche statues with replicas excavated at Side and Aspendos and the presence of a large number of Nike statues in contemporary nymphaea at Side and Perge suggest Pamphylian workshops.[555]

A third nymphaeum, willed by the wealthy aristocrat Tiberius Claudius Piso, was dedicated to Hadrian and displayed a large marble sculptural program.[556] Inscriptions on two statue bases relate that his heirs set up the statues according to his will, suggesting that they were responsible for the construction of the entire building. As a Roman knight and high priest of Apollo, the nymphaeum conveyed his social, religious, and political power through a careful selection of the subjects depicted in the portrait and mythological statuary and through the building's proximity to the Temple of Apollo Klarios. The niches in the nymphaeum provided space for 14 freestanding statues. On the upper story, two portrait statues of his heirs, one of which was represented as the Large Herculaneum woman, were carved out of marble, while two statues of Piso and one of Hadrian were cast in bronze. The lower level carried a scene of nine mythological statues, including a colossal seated Apollo Kitharodos, a lifesize Poseidon, two lifesize satyrs, two over-lifesize Aphrodites, a lifesize Dionysos, and two over-lifesize Heracles statues. Within this assemblage, Mägele discerned the presence of several different sculptural workshops,

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[555] S. Mägele, "The Sculptural Evidence of Sagalassos in its Urban Context," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor (Ann Arbor 2011) 328-331.
[556] S. Mägele, "The Sculptural Evidence of Sagalassos in its Urban Context," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor (Ann Arbor 2011) 331-334.

the implications of which will be discussed below. Isotopic analyses carried out on several of the statues indicate that the Poseidon and satyrs (Fig. 6.8) were carved from Dokimeion marble, while the Apollo Kitharados and Aphrodites were carved from Aphrodisian marble. Differences in style and workmanship led Mägele to identify different marble carving workshops responsible for statuary. Statues made of Dokimeion marble were finished with matte surfaces, had plinths of identical forms, and displayed similarities in modeling, and were attributed to Dokimeion workshops. The same uniformity of carving cannot be seen in the group whose marble was identified as Aphrodisian, and suggested as the production of an Aphrodisian workshop: the marble of the Apollo Kitharodos was highly polished, and the surface of the Aphrodite covered with rasp marks. Mägele believed that a Perge workshop was responsible for the Large Herculaneum woman since a number of replica statues of this type were excavated at Perge.

The Antonine nymphaeum, located along the north side of the North agora, was built between A.D. 160-180. The monumental single-story aedicular façade was ornamented with limestone architectural decoration and a statuary program. Imported marble architectural elements were limited to several blue and white monolithic columns from Dokimeion, yet the entire statuary program was made from marble. Two over-lifesize groups depicting Dionysos and a satyr were part of the original ensemble (Figs. 6.9 and 6.10); in the fourth century A.D., statues of Asklepios, Nemesis (Fig. 6.11), Koronis, Hygeia, Dionysos with Pan, Apollo, an unidentified male figure with sandaled feet - perhaps taken from the Temple of Apollo Klarios - were added to the original group. Both the Asklepios statue and the unidentified male figure (Fig. 6.12) were signed by a

Glykon, son of Alkimos, from Dokimeion.[557] Scientific analysis of several of these statues along with the Nemesis statue proved that the stone was of Dokimeion origin; the analyses performed on the Dionysos and Satyr group suggests an Aphrodisian origin.[558]

On the whole, the importation of marble was a rare event because the local limestone resources were sufficient for civic needs. Proximity, quality and variety of the limestone resources allowed Sagalassos to keep up with regional and empire-wide trends without having to invest in costly marble imports. From the Trajanic period onwards, Sagalassans used the fine white limestone as an alternative to white marble and local builders were able to translate the Asia Minor marble style into limestone since it was so receptive to carving fine architectural details.[559] As already mentioned, an honorific inscription implies that even the locals considered it a substitute and a source of pride: "concerning this monument, if it wrongly impresses to be executed in Phrygian stone, it misleads you. The stone originates locally."[560] Additionally, the availability of local white, pink, beige, green limestones and breccias made it possible for the city to keep up with the second century A.D. trend of using colored marbles in civic architecture. In the Antonine Pius Temple, the wall blocks, cornices, and architraves were made of the pink

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[557] M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 371-374.

[558] L. Moens, P. De Paepe, and M. Waelkens, "An Archaeometric Study of the Provenance of White Marble Sculptures from an Augustan Heroon and a Middle Antonine Nymphaeum at Sagalassos," in M. Waelkens and J. Poblome (eds.), Sagalassos IV (Leuven 1997) 367-384.

[559] M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 379.

[560] M. Waelkens, "Interdisciplinarity in Classical Archaeology. A Case Study: The Sagalassos Archaeological Research Project (Southwest Turkey)," in M. Waelkens and J. Poblome (eds.), Sagalassos IV. Report on the Survey and Excavation Campaigns of 1994 and 1995 (Leuven 1997) 225-252; J. Greenhalgh, Roman Pisidia. A Study of Development and Change, Ph.D. dissertation (Newcastle-upon-Tyne 1997).

limestone, while the doorframes, bases, and columns, capitals and friezes were rendered from the white limestone.[561] In the Antonine Nymphaeum, the back walls and monolithic columns on the exterior aediculae alternated between the green and light brown limestones; black and white breccia and imported blue and white Dokimeion columns decorated the central aediculae; the column bases, Corinthian capitals, back wall pilasters, archivolts, and the entire entablature were all carved from the white limestone.[562] These creative solutions allowed the builders to achieve the same bichrome and polychromatic effect usually associated with colored marbles.

Local workshops also specialized in the production of figural and ornamental relief sculpture in limestone as the stylistic similarities between 14 dancing girls on the frieze of the Augustan Northwest Heroon, the busts of gods carved in relief on a retaining wall in the Lower Agora, and reliefs of Muses on pedestals in the nymphaeum of Tiberius Claudius Piso attest.[563] Sculpture in the round, however, was not a part of the local limestone carving workshop's repertoire. The lack of examples of freestanding limestone statuary indicates that the material was considered unsuitable for carving freestanding statuary.

While the evidence is not sufficient to make definitive conclusions about the specific individuals behind the production and importation of statuary to Sagalassos, an exploration of different scenarios may help flesh out various possibilities. First, as

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[561] M. Waelkens, P. Degryse, L. Vandeput, L. Loots, and P. Muchez, "Polychrome Architecture at Sagalassos (Pisidia) during the Hellenistic and Imperial Period against the Background of Greco-Roman Coloured Architecture," in L. Lazzarini (ed.), ASMOSIA VI (Venice 2002) 527-528.
[562] M. Waelkens, P. Degryse, L. Vandeput, L. Loots, and P. Muchez, "Polychrome Architecture at Sagalassos (Pisidia) during the Hellenistic and Imperial Period against the Background of Greco-Roman Coloured Architecture," in L. Lazzarini (ed.), ASMOSIA VI (Venice 2002) 528.
[563] S. Mägele, "The Sculptural Evidence of Sagalassos in its Urban Context," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor (Ann Arbor 2011) 324-327, 333.

Mägele argues, the entire corpus of marble statuary at Sagalassos was finished by workshops outside of Sagalassos. On the basis of marble analyses, stylistic and technical affinities, these workshops include the Dokimeion workshops, which met the majority of Sagalassos' sculptural needs; Pamphylian workshops, who produced mythological and portrait statuary (Hera, Large Herculaneum Nemesis, and Hygeia) for Sagalassos as well as other Pisidian and Pampylian cities; and finally, the Aphrodisian workshops, commissioned to work on large-scale mythological statuary, but which in comparison to the Dokimeion and Pampylian workshops played a minor role in civic adornment.

Even if these assignments are correct, there are a number of scenarios in which these statues could have been manufactured. Foreign workshops may have shipped fully-finished statues from their home workshop; marble-workers could have traveled with their materials to complete the work at the commission site; experienced and well-connected artisan(s) from regional marble centers may have also permanently stationed themselves in a city and trained locals as assistants to satistfy a steady demand for sculpture. The lifestyle of a marble sculptor in antiquity seems to have been an itinerant one, and a number of sources corroborate this: the epigraphic record of travelling sculptors, artist's signatures, and the nature of the work, which required the sculptor be at the workshop or at the construction site. The suggestion that Hellenistic sculptors from Ephesus maintained their ethnic identity in Delos several generations after moving there also suggests degrees of mobility. Sculptors may have circulated to find temporary, commission-based work, or been permanently-settled in a particular location.

A city like Sagalassos without local marble resources may have become a small, regional marble production center in its own right. As seen throughout this study, the

stylistic affinities ascribed to marble carving workshops do not necessarily authenticate the origin of a marble; the opposite – that the origin of a marble does not reveal the origin of the craftsmen – may also hold true. The development of coastal cities of Pamphylia, such as Perge, Side, and Aspendos as marble-carving centers provide examples of this phenomenon. These cities had no local sources of marble, but by the second century A.D., the public monuments were largely built out of marble, and displayed the hallmarks of the Asia Minor 'marble style.' Large amounts of marble came from the quarries of Proconnesos, and as recently demonstrated, from Dokimeion. A recent study of Pampylian architectural decoration has concluded that permanent marble carving workshops existed in these cities; S. Young argues these Pamphylian craftsmen inherited their carving practices from Dokimeion, and combined these methods with a local decorative tradition, creating a marble style unique to the region.[564] In the case of the southern cities of Asia Minor, the marble coming by boat (from Proconnesos) or by land (from Dokimeion) may not necessarily have been accompanied by craftsmen since the local carvers had already been trained with non-local marble sources. Similarly, an enterprising Sagalassan could have gone to a nearby regional marble workshop, such as Dokimeion, Perge, or Aphrodisias, undertaken an apprenticeship with a master sculptor, come back to his hometown, and set up a permanent marble studio there. Evidence that illuminates the mechanisms for exporting materials to cities will be examined in further detail in the section on Pisidian Antioch.

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[564] S. Young, "Pamphylian Architectural Decoration in the Second Century A.D. Purely Derivative or an Independent Tradition?," Adalya 6 (2003) 171-188.

The expenditures associated with the logistics of transportation have created the patterns of consumption visible in the material record at Sagalassos. In large part, the city could participate in the marble culture because Dokimeion marbles bound for the wider Mediterranean were transported 250 km overland along the *Via Sebaste* and passed through Sagalassos. While great sums of money must have been spent on Dokimeion sculptural commissions, the use of the less commonly traded blue and white marble columns from Dokimeion as opposed to the famous purple and white marble may represent a cost-cutting measure. The Aphrodisian statues were transported a similar distance of 300 km up a gradual ascent of 1000 m, first along the Maeander river overland route, and then along the same *Via Sebaste* route used for the transport of Dokimeion marbles. The green Thessalian marble and Troad granite monolithic columns represent a similar investment of money because they had to be hauled up a steep and mountainous 1500 m ascent from the Pamphylian ports over a distance of 110 km from the Mediterranean sea. This arduous and expensive trip played a major role in the exclusion of large marble pieces, like monolithic columns or statuary, from outside of the Anatolian interior.[565] The presence of marble revetment from various locations throughout the Eastern Mediterranean can be explained by the fact that veneer, which was transported in blocks, was easier to ship, more readily available, and less expensive than other marble products. Still, the expenditure for over 80 tons of marble revetment in the city baths was considerable. Interestingly, the local builders always found the importation of architectural elements too cost-prohibitive and eschewed them in favor of

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[565] Marble consumption at Sagalassos is outlined in detail in M. Waelkens, P. Muchez, L. Loots, P. Degryse, L. Vandeput, S. Ercan, L. Moens, P. De Paepe, "Marble and the Marble Trade at Sagalassos (Turkey)," in J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (London 2002) 378.

locally available limestones. In conclusion, Sagalassos' well-preserved and systematically-studied Roman buildings allow us to make generalizations about marble consumption in a provincial Roman city. While the level described in this section may seem remarkable for a small-sized interior city located in difficult terrain, it may suggest that by the second century A.D., the traffic in marble had thoroughly permeated the region and that this was a relatively typical phenomenon in cities throughout Asia Minor.

PISIDIAN ANTIOCH

Geographic Setting and Historical Background

Pisidian Antioch lies in the inland lake district of western Anatolia, and in antiquity, along the shifting borders of Galatia, Pisidia, and Phrygia (Fig. 6.13). It is situated one km north of the modern town of Yalvaç on a low-lying foothill of the Sultan Dağları mountains. Unlike the rugged terrain that characterizes the rest of Pisidia, the city is surrounded by an agriculturally fertile plain, bounded only to the north and east by the mountains that cut Pisidia off from the arid Anatolian plateau.

Little is known about the pre-Hellenic history of the city, and there are few identifiable remains datable to this or the Hellenistic period. The worship of indigenous Anatolian deities, seen in the second century B.C. extra-mural cult sanctuary of the moon god Mên Askaênos, and Phrygian funerary doorstones, offers some clues as to the region's earlier cultural and religious affinities. Strabo, writing in A.D. 18, tells us that the city was founded in the third century B.C. as a Seleucid colony by a group of settlers

from Magnesia on the Maeander.[566] The establishment of Greek political institutions (a *boule*, *demos*, *strategoi*, and *grammateis*) in this period indicates that the city was organized and functioned as a typical Greek *polis*. Far removed from the network of cities along the coast of western Asia Minor, Strabo mentions only a handful of settlements in the interior, most of which were founded either through royal patronage or as defensive hilltop fortresses. The Hellenic-Phrygian character of the city was fundamentally altered with Roman imperial intervention when, in 25 B.C., Augustus designated Pisidian Antioch a *colonia*. As many as 3,000 Italian veterans from Legions V and VII were settled in Antioch as part of Augustus' campaign to guard against the notoriously war-like Pisidian tribes.[567] The construction of the *Via Sebaste*, secured a strategic position for the city as early as the Augustan era. Antioch lies at the intersection of the road, linking Apameia to the west, Perge to the south, and Antioch-on-the-Orontes to the east.

Identified in the early nineteenth century by F. Arundell, major excavations were undertaken by a University of Michigan team in 1924.[568] After this campaign, the site lay unstudied for many years until Waelkens and S. Mitchell conducted a survey of the monuments of the city in 1980-1981.[569] More recently, smaller projects have been

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[566] Strabo, Geography 12.8.14.
[567] B. Levick, Roman Colonies in Southern Asia Minor (Oxford 1967) 95.
[568] F. Arundell, Discoveries in Asia Minor, Including a Description of Several Ancient Sites and Especially Antioch of Pisidia (London 1834). Among the many publications from these excavations are F. Kelsey, "Antioch of Pisidia," The Michigan Alumnus 31 (Feb. 19) 403-405; D. Robinson, "A Preliminary Report on the Excavations at Pisidian Antioch and at Sizma, American Journal of Archaeology 28 (1924) 435-444; W. Ramsay, Das Monumentum Antiochenum (1927).
[569] S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998).

initiated to clarify the results of the early excavations.[570] In 2004, archaeologists from the University of Michigan returned to restudy the major monuments and compare those at Pisidian Antioch with others in Roman Asia Minor.[571] These combined efforts have revealed the basic urban framework of the city. Within the city walls, the major monuments were aligned, and the city was equipped with a theater, baths, nymphaeum, honorific arches, large open squares, and an imperial cult complex (Fig. 6.14). Outside the city are the well-preserved remains of a monumental aqueduct and the ruins of the important sanctuary of Mên Askaênos, 3.5 km away. The city famously received Paul on his first missionary journey within Asia Minor as told in the Acts of the Apostles, and by the Late Roman period, three churches had been built inside the city.[572]

B. Levick has claimed that Pisidian Antioch was designed to be a "little Rome on the border of Phrygia and Pisidia."[573] It is this notion that has led scholars to believe that the Roman settlers were mainly responsible for building the city.[574] The prevalence of Latin inscriptions related to civic governance is striking given that Greek and local dialects were the main languages spoken in the region.[575] Yet epigraphic evidence also bears witness to a multicultural society. Roman offices are listed alongside Greek ones, and priesthoods existed for Anatolian, Greek, and Roman gods. Along these lines, B.

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[570] M. Taşlıalan, Yalvaç. Pisidia Antiocheia (Istanbul 1993 and 1994); Ü. Demirer, Pisidian Antioch: St. Paul, Sanctuary of Men, Yalvaç Museum (Ankara 2002); M. Taşlıalan, R. Bagnall, T. Smekalova and S. Smekalova, "Magnetic Survey on the Acropolis of Pisidian Antioch," Archeologia Polona 41 (2003) 278-280

[571] E. Gazda and D. Ng (eds.), Building a New Rome: The Imperial Colony of Pisidian Antioch (Ann Arbor 2011).

[572] Acts of the Apostles, 13:13-41.

[573] B. Levick, Roman Colonies in Southern Asia Minor (Oxford 1967) 78.

[574] S. Mitchell, Anatolia: Land, Men and Gods in Asia Minor (Oxford 1993) 104; S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998) 161, 167.

[575] B. Levick, Roman Colonies in Southern Asia Minor (Oxford 1967) 134 and for the epigraphic attestations see, S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998) 222.

Rubin has argued that Roman colonists and Greco-Phrygian elites collaborated to build the imperial cult complex in order to bring cohesion among potentially disparate segments of the population.[576] Similarly, A. Ossi shows how the form, design, and decoration of the arches of Augustus and Hadrian blended Italic, Hellenistic, and local elements reflective of the city's unique historical situation.[577]

As a supplement to these arguments, I contend that an analysis of the building materials and carving styles helps us to ascertain the identity of the craftsmen responsible for civic building. Local artisans of Greco-Phrygian and Italian extraction carved the main limestone buildings of the city, but because a local carving tradition in marble did not exist at Pisidian Antioch, architects and builders relied on Dokimeion marble for sculptural adornment in ways that must have been similar to Sagalassos.[578] Political and personal ties between imperial agents and the leading families in Pisidian Antioch and Dokimeion gave the city access to Dokimeion marble workshops. These social networks cemented the mechanisms for the diffusion of marble statuary, and allowed Pisidian Antioch to create a marble statuary landscape in a city that did not have a local tradition of marble carving.

Quarries and Carving Traditions at Pisidian Antioch

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[576] B. Rubin, "Ruler Cult and Colonial Identity: The Imperial Sanctuary at Pisidian Antioch Revisited," in E. Gazda and D. Ng (eds.), Building a New Rome: The Imperial Colony of Pisidian Antioch (Ann Arbor 2011) 33-60.

[577] A. Ossi, The Roman Honorific Arches of Pisidian Antioch: Reconstruction and Contextualization, Ph.D. dissertation (Ann Arbor 2009); A. Ossi, "Pisidian Antioch: The Urban Infrastructure and its Development," in E. Gazda and D. Ng (eds.), Building a New Rome: The Imperial Colony of Pisidian Antioch (Ann Arbor 2011) 85-108.

[578] Because Ramsay and Robinson's early excavations were conducted very quickly and the finds never fully published, this section, this should be considered a partial overview.

There are no marble deposits in the territory of Pisidian Antioch. The main infrastructure of the Roman city was built out of a white and gray limestone.[579] The limestone was hewn from the steep cliffs above the Anthius River on a hillcrest southeast of the city where a series of at least six quarries lie.[580] (Fig. 6.15). The deeply incised river bed prohibited a straight-line route of transportation, and the materials were carted from the extraction site down the sizeable western slopes, across the river, and up eastern side of the low-lying hill on which the city was situated. The quarries on Karakuyu, which furnished a dark gray limestone, were associated with the construction of the nearby Sanctuary of Mên Askaênos.[581] Several quarries were identified two km to the west and one km to the east of the sanctuary, where the vestiges of a slipway strewn with limestone scree is still visible.[582]

The epigraphic record relates that limestone could be purchased in set amounts by private citizens. An inscription set at the bottom of the steps of the Augustan propylon says that a T. Baebius Asiaticus paid for 3,000 Roman feet of street paving, which Mitchell and Waelkens postulated as the total area of the major east/west and north/south streets as well as the Tiberia Platea.[583] The white limestone also seems to have been purchased and transported from the quarries near the city for the construction of the Mên Askaênos temple. The portico colonnade, the Ionic columns, and frame of the cella door were all cut from the white limestone, while the dark grey limestone was used in the

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[579] For regional limestone deposits, see A. Philippson, Handbuch der Regionalen Geologie Vol. 2 (1918) pl. 1.
[580] S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998) 91.
[581] J. Sterrett, The Wolfe Expedition to Asia Minor. Papers of the American School of Classical Studies at Athens II (1888) 218.
[582] S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998) 87, n. 28.
[583] S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998) 221.

temenos, *euthynteria*, and *crepidoma*.[584] The phenomenon of contrasting different colored limestones is seen in other monuments within the city, including the imperial cult sanctuary and the Hadrianic arch, yet the lack of a detailed study on the local stone sources precludes further interpretation.[585]

Craftsmen clearly preferred the white limestone for carving purposes, and motifs particular to Pisidia suggest local carving workshops. The shields, greaves, and cuirasses on the frieze of the arch of Augustus mirror examples found on city gates and on funerary monuments in other Pisidian cities, such as Sagalassos,[586] Selge,[587] and Cremna.[588] Vandeput recognized a number of stylistic similarities between the architectural decoration of various buildings at Sagalassos and those at Pisidian Antioch, suggesting that the monuments were completed by teams of workmen from the region.[589] The Greek masons' marks discovered on the cornice blocks from the Augustan imperial cult temple indicate that the masons were trained in Asia Minor. Further evidence, such as the case of P. Vitelius, who made a dedication in the Temple of Mên Askaênos and identified himself as a *tektor* (craftsman), reveals that local artisans could garner some social standing for themselves.[590]

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[584] S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998) 51.
[585] A. Ossi, The Roman Honorific Arches of Pisidian Antioch: Reconstruction and Contextualization, Ph.D. dissertation (Ann Arbor 2009).
[586] L. Loots, M. Waelkens, F. Depuydt, "The City Fortifications of Sagalassos from the Hellenistic to Late Roman Period," in M. Waelkens and L. Loots (eds.), Sagalassos V (Leuven 2000) 605; V. Köse, Nekropolen und Grabdenkmäler von Sagalassos in Pisidien in Hellenistischer und Römische Zeit (Turnhout 2005).
[587] A. Machatschek and M. Schwarz, Bauforschungen in Selge (Wien 1981).
[588] S. Mitchell, Cremna in Pisidia (London 1995).
[589] L. Vandeput, The Architectural Decoration in Roman Asia Minor. Sagalassos: A Case Study (Turnhout 1997).
[590] L. Khatchadourian, "The Cult of Mên at Pisidian Antioch," in E. Gazda and D. Ng (eds.), Building a New Rome: The Imperial Colony of Pisidian Antioch (Ann Arbor 2011) 167-168.

The decorative programs on the Hadrianic and Augustan arches and the temple within the imperial cult complex show the local carving workshops were capable of producing the full range of architectural forms as well as relief sculpture. Their skills have been criticized as inferior by Ward-Perkins, who dismissed the decoration of the arch of Hadrian as a "typically provincial product of baroque taste misunderstood,"[591] and Vandeput, who said that the acanthus leaves on the same arch appeared to have been "cut with scissors out of stone."[592] Underlying these aesthetic judgments is the implication that these were local interpretations of Greco-Roman architecture carried out by local craftsmen. In contrast, Ossi and Rubin's architectural studies on individual buildings provide further evidence for how the local population worked together to create monuments reflective of their city's unique ethnic history.

Marble Consumption at Pisidian Antioch

The consumption of marble at Pisidian Antioch began in the Augustan period and continued at least through the Severan period. Marble imports consisted primarily of freestanding statuary, although there are occasional examples of marble architecture and inscriptions. The greatest amount of marble imported to the city occurred during the construction of the imperial sanctuary. The imperial cult complex consisted of a monumental propylon, and an ornate Corinthian prostyle temple surrounded by a colonnaded plaza called the Augusta Platea, all of which were adorned with statuary. The part of the sculptural program, however, that can be recreated with the greatest

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[591] J. Ward-Perkins, Roman Imperial Architecture (New Haven 1994) 280.
[592] L. Vandeput, The Architectural Decoration in Roman Asia Minor. Sagalassos: A Case Study (Turnhout 1997) 94.

accuracy is on the propylon. A series of statues stood on the attic of the arch. Ossi's reconstruction of the arch, however, suggests they may have stood in the niches.[593] A head of Augustus (Fig. 6.16),[594] the goddess Victory,[595] and portions of statues presumed to represent members of the imperial family include a torso of a draped female statue, a colossal female statue standing on a round base, the upper part of a colossal draped male of the Zeus Dresden type, the lower half of a colossal togate male, and a statue that preserves the lower portion of a partially draped male with a barbarian captive kneeling at his feet.[596] Ramsay kept no record of the excavated sculptures, although Robinson published one picture from Ramsay's finds, including "several interesting heads or parts of heads," some of which appear to be Julio-Claudian in date.[597] This photograph, in particular, reveals that the excavators had uncovered dozens of fragments of imperial portrait statues within the Augusta Platea. These must have originally stood in the porticoes and cella of the imperial temple. M. Taşlıalan's recent excavations uncovered a Head of Marcus Aurelius in the western porticoes.[598] Most of the iconographic decoration of the temple was rendered in limestone; the only marble architecture in the temple was a series of six marble acroteria that surmounted the roof of the Temple of Augustus; their unusual iconography indicates they were special commissions. The

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[593] A. Ossi, The Roman Honorific Arches of Pisidian Antioch: Reconstruction and Contextualization, Ph.D. dissertation (Ann Arbor 2009) 32.
[594] D. Robinson, "Two New Heads of Augustus," American Journal of Archaeology 30.2 (1926) 125-136.
[595] D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," The Art Bulletin 9.1 (1926) 45, fig. 61.
[596] See, respectively, D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," The Art Bulletin 9.1 (1926) 45, fig. 61; 41, fig. 55; fig. 56-57; 42, fig. 60; 45, fig. 59; 42, fig. 58.
[597] D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," The Art Bulletin 9.1 (1926) 69, fig. 127.
[598] M. Taşlıalan, "Pisidia Antiocheia'sı 1991 Yılı Çalışmaları," III. Müze Kurtarma Kazıları Semineri (1993) 268, fig. 21.

acroteria depicted a goddess with crowned disk symbolizing either the moon or the sun rising from acanthus leaves.[599]

The Sanctuary of Mên Askaênos held a number of dedicatory marble statues. Votives in marble represented a greater investment of money for cult members, and they must have stood out within the temple precinct. The inscribed statue of Cornelia Antonia, datable to the middle Antonine period, was found in the temenos (Fig. 6.17).[600] The drapery of her chiton and himation has parallels in other portrait statues from Asia Minor, notably a roughly contemporary statue of a woman from Acmonia produced in the late Antonine period. The two statues may have been produced in the same workshop.[601] Other statues found inside the complex include a statue of a young man with curly hair and a plinth of a statue of a certain Tibereinos.[602] Marble inscriptions, alongside inscribed limestone plaques, steles, and columns, represented another type of dedication. Additionally, a number of cultic statuettes were made from marble, including a statuette of Mên, a female resting against a high crown, perhaps the Hellenized form of Cybele, and a statuette of Hekate.[603]

The stage façade of the theater at Pisidian Antioch was also well-appointed. Taşlıalan reconstructs the lower level as having white marble Ionic bases, flat granite

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[599] See B. Rubin, "Ruler Cult and Colonial Identity: The Imperial Cult Sanctuary at Pisidian Antioch Revisited," in E. Gazda and D. Ng (eds.), Building a New Rome: The Imperial Colony of Pisidian Antioch (Ann Arbor 2011) 50, n. 69 for a discussion of identification. D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," The Art Bulletin 9.1 (1926) 17, fig. 30.
[600] J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) n. 287.
[601] J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) n. 249.
[602] J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) no. 288; S. Mitchell and M. Waelkens, Pisidian Antioch: The Site and its Monuments (London 1998).
[603] For a discussion of the iconography and identification, see L. Khatchadourian, "The Cult of Mên at Pisidian Antioch," in E. Gazda and D. Ng (eds.), Building a New Rome; The Imperial Colony of Pisidian Antioch (Ann Arbor 2011) 161-170.

shafts, and yellow marble Corinthian capitals; the fragmentary remains of several female portrait statues are suggestive of the theater's original statuary program.[604]

A number of important statues were unearthed during the early excavations at the site, yet the lack of documentation hinders the possibility of placing many of these statues in their original context. A selection includes the head of a young woman from the Julio-Claudian period, two heads of Lucius Verus, and a seated statue of Zeus signed by Menandros from Dokimeion dated to the Augustan period (Fig. 6.18), a miniature version of this same statue, the statue of a man dated to the late Antonine period, and a priest from the time of Septimius Severus.[605] These statues may have been a part of the statuary programs in the buildings described above, the second century A.D. nymphaeum, or the Hadrianic arch at the entrance to the city, all of which provided ample space for freestanding statuary.

The varied scenarios of statuary manufacture described in the section on Sagalassos were just as likely to have occurred at Pisidian Antioch. The fine-grained marble with a sugary texture, characteristic of Dokimeion marble, is seen in all of the statuary excavated at the site; this suggests that the statues were carved entirely from this source. As discussed in chapter four, it is also likely that much of marble sculpture was transported nearly-finished from the nearby Dokimeion sculptural workshops.[606] An

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[604] M. Taşlıalan, "Pisidia Antiocheia'sı 1995 Yılı Çalışmaları," VII. Müze Kurtarma Kazıları Semineri (1997) 335; H. Mallampati and Ü. Demirer, "Architecture, Entertainment, and Civic Life: The Theater at Pisidian Antioch," in E. Gazda and D. Ng (eds.), Building a New Rome: The Imperial Colony of Pisidian Antioch (Ann Arbor 2011) 69.

[605] See, respectively, J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) no. 285; no. 50-51; no. 287; no. 288; D. Robinson, "Roman Sculptures from Colonia Caesarea (Pisidian Antioch)," The Art Bulletin 9.1 (1926) 56, fig. 116.

[606] J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) 37.

analysis of sculptor's signatures in chapter three demonstrated that Dokimeion artisans were active throughout the marble-poor cities of central and southern Anatolia. Moreover, the similarities in marble grain size, typological, stylistic, and technical characteristics between various statues as well as a Dokimeion sculptor's signature indicate that these workshops played a major role in the sculptural adornment of the city.

The strongest evidence for linking the Pisidian Antioch statuary to Dokimeion comes from a sculptor's signature on the plinth of a seated sculpture of Zeus, in which one Menandros states that he made the statue and that he is from Dokimeion (Fig. 6.18). The presence of neck struts, and the similarities in the treatment of the eyes, eyebrows, mouth, hair, and surface treatment in the portraits of Cornelia Antonia, Lucius Verus, a young man, and a priest suggest the statues originated from the same workshop.[607] Inan and Rosenbaum noted a preference for this workshop to use the drill to create abruptly ending channels, and this same technique has been observed in the Dokimeion columnar sarcophagi.[608] Stylistic parallels with statues discovered in other Pisidian cities that are known to have been produced at Dokimeion also link production to the quarries. The Antiochene portrait of Augustus has strong stylistic affinities with the Sagalassan idealized portrait of the young man found in the Northwest Heroon, whose marble was identified by chemical analysis as Dokimeian, and there are strong physiognomic affinities between the priest from Antioch and the colossal head of Marcus Aurelius in the Baths at Sagalassos.[609] The nearly identical drapery of the statue of Cornelia Antonia

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[607] J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) 37.
[608] M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 652, n. 87.
[609] S. Mägele, Die Plastischen Bildwerke von Sagalassos, Ph.D. dissertation (Köln 2009) 55.

and that of late Antonine woman from nearby Acmonia are also suggestive of the work of Dokimeion craftsmen.[610] The bodies and drapery are so similar to one another that they may indicate serial production with only the heads being finished individually.[611] Inan and Rosenbaum believed that the abundance of marble statuary was evidence for the establishment of a local marble workshop at Pisidian Antioch. Similarities in styles could reflect the work of a Dokimeion-trained artisan, who was either an itinerant sculptor from Dokimeion, or a local Pisidian Antiochene who had undertaken an apprenticeship at Dokimeion and come back to set up a marble workshop in his hometown.

Geographic proximity and well-established transport routes facilitated the importation of marble to the city. To reach Pisidian Antioch, the marble was transported from Dokimeion from the quarries through the administrative center at Synnada and onwards to Apameia, and from here, along the *Via Sebaste* to Pisidian Antioch, a distance of approximately 70 km. Given that Pisidian Antioch is bounded by the high Sultan Dağları and Lake Eğirdir, the route was neither easy, nor direct, but as discussed in the previous chapters, the *Via Sebaste* was a regular route used for the transportation of Dokimeion marbles.

Large-scale exploitation of the Dokimeion quarries has been linked to the Augustan era, and the introduction of Dokimeion marble to both Pisidian Antioch and Sagalassos occurred during this period. The foundation of Pisidian Antioch and other Augustan veteran colonies in the region must have catalyzed the exploitation of the

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[610] J. Inan and E. Rosenbaum, Roman and Early Byzantine Portrait Sculpture in Asia Minor (London 1966) 37.
[611] M. Waelkens, "From a Phrygian Quarry: The Provenance of the Statues of the Dacian Prisoners in Trajan's Forum at Rome," American Journal of Archaeology 89.4 (1985) 652, n. 87.

Dokimeion quarries. The evidence from within Pisidian Antioch tells us less about the identities of the marble craftsmen and more about the web of connections that gave cities access to materials from the quarries. Mitchell has noted that the presence of three members of the imperial family and two Augustan generals at Pisidian Antioch during the construction of the imperial cult temple is a striking coincidence and that imperial funding may have contributed towards construction costs.[612] To this, I would add that these agents of Augustus provided direct access to the imperial quarrying operations at Dokimeion. Furthermore, Fant has linked a *caesura* chief (head of the extraction team at the quarries) named Maryllinus - mentioned on three blocks dated to A.D. 222 and 229 - to a leading family at Pisidian Antioch.[613] The cognomen Maryllinus is very rare, and has only been found in the *Gens Dottia* from Pisidian Antioch; a Cn. Dottius Plancianus was a benefactor of Pisidian Antioch and became Asiarch under Marcus Aurelius.[614] Interestingly, Maryllinus is the only quarry functionary securely attested as a local man. As described in chapter four, *caesura*-holders were usually private contractors responsible for extraction, and they operated under a range of agreements.[615] The contractor could have received a fixed payment, in which he was obliged to extract a set number of quarried products, and would have been paid only when this quota had been

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[612] S. Mitchell, "Imperial Building in the Eastern Roman Provinces," Harvard Studies in Classical Philology 91 (1987) 348.
[613] C. Fant, Cavum Antrum Phrygiae: The Organization and Operations of the Roman Imperial Marble Quarries in Phrygia (Oxford 1989) 34-35, n. 217, 220-221.
[614] CIL 5081 records a Dottius Maryllinus, father of Dottius Plancianus, patron of the colony and Asiarch under Marcus Aurelius; further evidence for the connection can be found in CIL III 6835, 6837and throughout CIL VI. See C. Fant Cavum Antrum Phrygiae: The Organization and Operations of the Roman Imperial Marble Quarries in Phrygia. Internatinal Bar Series 482 (Oxford 1989) n. 220 for the full explanation. B. Levick, Roman Colonies of Southern Asia Minor (Oxford 1967) 127 describes Dottius Plancianus' career in detail.
[615] M. Christol and T. Drew-Bear, "De Lepcis à Aizanoi: Hesperus Procurateur de Phrygie et l'Administration des Carrières de Marbre," J. Desmulliez and C. Hoët-Van Cauwenberghe (eds.), Le Monde Romain à Travers l'Èpigraphie: Méthods et Pratiques (Villeneuve 2005) 189-216.

met. Alternatively, the *caesura* could have leased a section of a quarry out, and paid rent before the objects were exported. Centurions, along with nearly 20 names with no identifiable social status, are named as *caesura*-holders. Fant has suggested that this position was not a low-status occupation given that none of the other *caesura* were slaves and that Maryllinus came from a well-placed family. The epigraphic pairing of the terms *caesurae* and the workshops associated with cities - *officina Ephesia, Neicaensis, Smurnaiorum,* and *Prusaensis* - is particularly illuminative for understanding how materials were channelled from the quarries to building projects in specific cities. Maryllinus' ties to Pisidian Antioch may have even helped him reach a quota for the extraction of blocks and secure buyers. It could have been profitable for a person in his position to colloborate with individuals living in marble-poor cities to set up an export system that supplied materials on a regular basis. Maryllinus represents a link in the chain within what must have been a vast web of connections that existed in cities throughout Asia Minor.

The incomplete excavation record prohibits making larger statements about the embeddedness of the marble trade at Pisidian Antioch. Like the other regional cities, Pisidian Antioch relied primarily on local limestone resources for civic building. Very few stone resources were exploited for the construction of the city in comparison to the number of quarries opened in the territory of Sagalassos. Archaeological excavations have demonstrated that statues constituted the single largest category of marble consumption at Pisidian Antioch, and that most of these were brought to the city in connection with the building of the imperial cult complex. In order for the newly founded *colonia* to proclaim itself as an important regional city, the citizens of Pisidian

Antioch embarked on a program of monumentalization in the Augustan period, and used their imperial connections to gain access to the Dokimeion quarries and create a marble statuary landscape.

CONCLUSION

The relationship between local resources and local artistic environments in the marble-poor cities of Pisidia was much the same as in marble-rich cities. The locally available limestone was the main building material used for civic adornment, and this was because they were cheaper and because local craftsmen were familiar with working with them. Most architectural elements were fashioned from limestone, but in special cases marble columns, bases, and revetment were imported to showcase the generosity and wealth of the benefactor. Marble statues were brought in great numbers to both cities, and constitute the single largest category of marbles consumed. In contrast to the purely luxury-driven marble trade in marble-rich cities of Asia Minor, the importation of marble statuary was a trade born of necessity. In order for Sagalassos and Pisidian Antioch's aristocratic citizens to ensure their social standing and compete on a regional-level, these two marble-poor cities needed to create a monumental city, whose framework was born of marble, and some of this urban armature, like statuary, could not be translated into locally available materials. The various circumstances of their production - the importation of sculpture finished by foreign workshops, itinerant craftsmen, apprenticeships, and the establishment of marble workshops in marble-poor cities - have been considered as possibilities, and suggest that the urban building programs in marble-

poor cities provided artisans opportunities for work, profit, and a measure of social mobility. Finally, it is possible to see how the historical circumstances unique to each city affected the trajectory of participation in the marble trade; personal connections, such as the ties between the Dokimeion quarries and the citizens of Pisidian Antioch, wealth, and populations with diverse needs and interests shaped urban transformation.

CHAPTER 7

CONCLUSION

Asia Minor is a region rich in high-quality marble resources, and the procurement of marble as a building material was vital to urban development in the Hellenistic and Roman periods. Evidence drawn together in this dissertation from archaeological excavations, regional and geological surveys, literary and epigraphic sources, and economic and scientific analyses has situated ancient marble quarries within their wider socio-economic landscapes. With urban centers and their rural territories viewed as a single unit, the scale of inquiry has been opened from the site to the region, revealing patterns of activity that point toward new ways of understanding an industry that was a fundamental part of Roman society. In particular, this research highlighted landowners and craftsmen, institutions, and municipalities and the connections between the exploitation of marble resources, local artisanal traditions, and exchange markets within Asia Minor. An investigation of the exporting quarries of Dokimeion and the cities of Aphrodisias, Ephesus, Pisidian Antioch, Sagalassos, and Sardis as case studies has focused on production mechanisms, exchange networks, and consumption practices in Asia Minor, among other issues. On the one hand, because the monumental building projects of the Hellenistic and Roman periods relied in large part on locally available

marble deposits, quarrying has long been tied to urban development. On the other hand, state-takeover of certain quarries, the display of foreign marbles in imperial architecture in Rome, and the special qualities ascribed to various marbles led to an empire-wide commercialization and consumption of marble. The quantities and types of stone exploited in Asia Minor during the Roman period were not again surpassed until the modern era. Marble production in antiquity offered the promise of work, profit, and social mobility to various segments of the population on an unprecedented scale.

METHODOLOGICAL CONTRIBUTIONS

Aphrodisias in Context

The data drawn from the Aphrodisias Regional Survey has allowed for a detailed investigation of marble quarrying in the territory of Aphrodisias and a starting point for a larger, regional study. I have presented the results of archaeological fieldwork, which forms the basis for this dissertation, with a number of goals in mind. First, new fieldwork sheds light on and localizes the marble quarrying activities within the single region of Aphrodisias and allows for a re-examination of the role that marble played in the social and economic life of the city. Because modern scholarship has singled out Aphrodisias as a place of prominence in Roman marble production, it is necessary to re-evaluate and contextualize Aphrodisias in light of the new evidence, and assess whether Aphrodisias used its marble resources in ways that were exceptional or typical. With this in mind, I have undertaken a comparative study with a regional economic perspective. The research illuminates a number of larger questions, and the combination of methods I use offers

new data, approaches, and cautionary tales for the interpretation of the marble culture of the Roman empire. In the following section, I summarize the impact the primary research from the Aphrodisias Regional Survey has had on various methodological and historical issues in classical archaeology, and in particular, consider the contributions the quarry survey makes to the applications of the geochemical analyses used in marble sourcing. Then, I assess the ways in which scientific analysis adds to our understanding the operation of Aphrodisian workshops both at home and abroad. Finally, I show the importance of using quarry volumes to estimate the size, output and relative importance of marble carving centers to one another.

Regional survey and scientific analysis. A goal of the dissertation was to analyze the chemical and physical properties of Aphrodisian marble, assign a unique characterization signature to it, and then use the geoarchaeological results as a tool to address the long held assumption that Aphrodisian marble was widely traded. Collaboration with bedrock geologist Carola Stearns as part of the Aphrodisias Regional Survey, allowed for a number of observations on the limitations of applying characterization and exchange methods to white marbles. First, the discovery of eight new quarries during the course of our survey project demonstrates the general fact that not all ancient quarries have been identified, documented, and analyzed. As always archaeologists work with a dataset that cannot be regarded as complete. Secondly, geological surveys have shown that marble beds formed in the same geological age can stretch over hundreds of miles. The Aphrodisias marble quarry survey, which covered 475 km^2, showed that similarly aged marbles within the same geological formation give identical isotopic signatures. Isotopic analysis alone cannot distinguish the Aphrodisias

white marble sources from one another, or from several other major white sources traded in antiquity. Because the Menderes massif stretches approximately 100 km to the southwest of Aphrodisias, it is possible that other undiscovered quarries within the same formation produce similar signatures. Marbles of a different geological age within the survey area do, however, give separate isotopic signatures; the isotopic signatures of the Late Paleozoic mottled-blue gray and white marble from the Yazır Quarry is unique in comparison to the Mesozoic white marbles in the survey region. This has also been observed at Ephesus, where recent scientific analyses have distinguished the geological ages of the marbles with the result that chemical analysis can discriminate between different quarries.

While it is well-established that the application of one type of test cannot be a single determinant in distinguishing the most prolific ancient Greek and Roman marble quarries from one another,[616] close observation of the marble stratigraphy within the quarries allowed us to comment in detail about the geological parameters affecting isotopic composition. The isotopic signature of Aphrodisian white marble covers a particularly wide area in comparison to the signatures of other medium to coarse grain white marbles. As Stearns has noted, the range of carbon values from 1.0 to 2.5‰ is due to the variation in the composition of the original organic shell fragments.[617] The lower carbon values, due to increased organic content, are characteristic of the white marbles with darker gray colors. Likewise, the range of oxygen values varies from -2.5 to -4.5‰.

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[616] C. Gorgoni, L. Lazzarini, P. Pallate, and B. Turi, "An Updated and Detailed Mineropetrographic and C-O Stable Isotopic Reference Database for the Main Mediterranean Marbles Used in Antiquity," J. Herrmann, N. Herz, and R. Newman (eds.), ASMOSIA V (Boston 2002) 115–31.
[617] C. Stearns, "Geoarchaeological Investigations," in C. Ratté and P. De Staebler (eds.), Aphrodisias V: The Aphrodisias Regional Survey (Mainz forthcoming).

An examination of the geological stratigraphy shows that hand samples taken from marbles in close proximity to silicate rocks give very negative oxygen values. The negative values are likely a result of the interaction of fluids flowing along fractures near the surface during diagensis and metamorphism. Our marble quarry survey shows the need for a detailed chemical investigation of the marbles within the Menderes massif. A database of samples from ancient marble quarries should be created in order to provenance marbles reliably within this important ancient marble production zone. The results of further research are underway, but not yet complete. A multi-method statistical approach that includes petrographic, strontium isotopic, electroparamagnetic resonance spectroscopy (EPR), and trace element analysis is essential for future research on Aphrodisian marble.

The marble quarry survey did not achieve the goal of pinpointing a unique signature for the marbles from Aphrodisias, but it did provide instructive strategies for assessing the reliability of other assignments made on the basis of scientific analysis. Throughout the dissertation, scientific analysis was used as a methodological tool for understanding trends in the ancient marble trade. Given the issues historically associated with the identification of white marbles, when scientific evidence was presented, it was treated with caution. Scientific methods used to discriminate between white marbles have not necessarily been successful in securely identifying origin, but rather in eliminating the possibilities of a marble's origin. In particular, we have seen in the context of the Aphrodisias Regional Survey that chemical testing of white marbles provides a resolution on a regional scale as defined by geology. For the purpose of this study, reliable assignments were based upon the combination and an assessment of multi-

method statistical and scientific approaches, stylistic observations, and geological and archaeological contexts.

Geochemical and stylistic analysis. Scholars have employed formal analysis to posit that marble carving of a particular style reveals both the origin of the marble and the ethnicity of the artisan. The application of geoarchaeological analysis to these issues is an important tool that allows us to test currently held beliefs concerning marble production in the Roman world - and Aphrodisias lies at the center of a number of these debates. Continous excavations have revealed that the major civic and sculptural monuments of the city were almost entirely built of marble. The proximity of the marble quarries to Aphrodisias, the epigraphic and archaeological evidence for the local sculptural tradition, and the extraordinary preservation of the city's marble architecture have led scholars to assign these quarries and the marble industry in general a prominent role in Aphrodisias's history.[618] The prosperity of the city has been attributed to the exploitation and exportation of marble,[619] and profits from private ownership of the quarries have been directly linked to the euergetism that fueled the ambitious urban development of this medium-sized but remote town in the first and second centuries A.D.[620]

The notion that Aphrodisias was the locus of an important "school" of virtuoso sculptors took root in the mid-twentieth century in the wake of the French and Italian excavations at the site.[621] Even before these excavations, Aphrodisias was already well

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[618] K. Erim, Aphrodisias (New York 1986) 30–31, 134–36.
[619] D. Monna and P. Pensabene, Marmi dell'Asia Minore (Rome 1977) 94.
[620] J. Reynolds, Aphrodisias and Rome (London 1982) 156–64; K. Erim, Aphrodisias (1986) 32.
[621] M. Collignon, "Notes sur les Fouilles Executées à Aphrodisias par M. Paul Gaudin," Comptes Rendus des Séances de l'Académie des Inscriptions et Belles-Lettres (1904) 703–11; G. Jacopi, "Gli Scavi della

known for its expert sculptors due to the fact that nearly 40 sculptures signed by Aphrodisian craftsmen had been discovered throughout the Mediterranean.[622] By the time the current program of excavations began at Aphrodisias in the early 1960's, the belief that local workshops shipped both their statues and their sculptors across the empire was well established and had begun to influence the interpretation of archaeological evidence elsewhere.[623] Through a comparative approach, this study has tried to evaluate at each level the notion that sculptures in the style of those excavated at Aphrodisias were by Aphrodisian sculptors, and were carved in Aphrodisian marble.

Because the conflation of craftsmen and source has proved problematic, these two subjects should be kept separate. The on-site identification of marbles used at Aphrodisias as well as the chemical analysis of archaeological materials, presented in chapter three, show that the local marble resources were used in nearly all of the monuments within the city; Aphrodisian craftsmen - almost exclusively - relied on locally available resources. The results of several scientific studies outside of Aphrodisias, however, have also cast doubt on the large number of commissions ascribed to Aphrodisian workshops in Aphrodisian marble and have deconstructed the equation of material, style, and ethnicity of the artisan. The role of Aphrodisian marble in the architectural decoration of the Severan Forum and Basilica at Lepcis Magna has been discredited on the basis of isotopic analysis, which shows that the origin of the marble is

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Missione Archeologica Italiana in Afrodisiade," Monumenti Antichi 38 (1939–40); F. Squarciapino, La Scuola di Afrodisias (Rome 1943).

[622] F. Squarciapino, La Scuola di Afrodisias (Rome 1943).

[623] F. Squarciapino, La Scuola di Afrodisias (Rome 1943); K. Erim, Aphrodisias (New York 1986) 32; J. Ward-Perkins, Marble in Antiquity (London 1992) 153; P. Pensabene, Marmi Antichi II (Rome 1998) 45; N. De Chaisemartin, "Technical Aspects of the Sculptural Decoration at Aphrodisias in Caria," in M. Schvoerer (ed.), ASMOSIA IV (Bordeaux 1999) 261–67.

Proconnesian.[624] Isotopic analysis of pilasters in the marble hall in the Terrace House at Ephesus, presented in chapter five, indicates that the pilasters were not produced in Aphrodisian marble by an Aphrodisian workshop, but more likely in the local Ephesian marble by an Ephesian workshop. These results, however, do not exclude the possibility that members of an Aphrodisian workshop worked alongside – and were likely outnumbered by - other foreign and local craftsmen.

Evidence concerning the origin of the material that Aphrodisian marble sculptors used for statuary that was either exported or produced in branch workshops abroad remains inconclusive, and makes it difficult to comment on whether there was ever a settled community of Aphrodisian craftsmen working in Rome. The origin of the white marble in the so-called Esquiline Group, signed by Aphrodisian sculptors, and now in the Ny Carlsberg Glyptotek Copenhagen, has variously been assigned to Carrara[625] and to Göktepe.[626] The Italian team in favor of the Göktepe assignment argues that the weak EPR intensities are more consistent with Göktepe marbles, and on this basis they believe that their results trump those of an earlier study that assigned the marble to Carrara based on isotopic analysis alone. Their hypothesis remains uncertain, however, because the four samples fall near or below the statistical threshold of a secure assignment; fingerprinting of only one district within Göktepe is reliable; and sampling of the white Göktepe quarries is still not exhaustive. The type of marble used in the Esquiline Group

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[624] F. Bianchi, M. Bruno, C. Gorgoni, P. Pallante, and G. Ponti, "The Pilasters of the Severan Basilica at Leptis Magna and the School of Aphrodisias: New Archaeometric and Archaeological Data," P. Jockey (ed.), ASMOSIA VIII (Aix-en-Provenace 2011).
[625] K. Matthews and S. Walker, "Report on the Stable Isotope Analysis of the Marble of the Esquiline Group of Sculptures at the Ny Carlsberg Glyptotek, Copenhagen," in C. Roueché and K. Erim (eds.), Aphrodisias Papers 1 (Ann Arbor 1990) 147–51.
[626] D. Attanasio, M. Bruno, and A. Yavuz, "The Ancient Black and White Marble Quarries of Aphrodisias at Göktepe (Muğla, Turkey)," Journal of Roman Archaeology 22 (2009) 312–48.

is significant for archaeological interpretation. An assignment to Göktepe implies the regular exportation of both marble and craftsmen from Aphrodisias to Rome. An assignment of Carrara to the Esquiline group would imply that the itinerant, or permanently-settled, Aphrodisian craftsmen in Rome relied on sources available in their new homes. The normative model derived from research in this study – that artisans, working either at or away from home, used the marbles locally available to them - suggests the latter. Yet both of these scenarios remain speculative, and definitive conclusions await further art historical, archaeological, and geochemical research.

It is now possible to comment on the production of sculpture with similar formal typologies to those excavated at Aphrodisias, such as the architectural decoration in the Severan Forum and Basilica at Lepcis Magna,[627] the groups of statues at a Late Antique villa at Chiragan in Gaul, and the pilaster capitals in Terrace House 2 at Ephesus.[628] In summary, the stylistic affinities - seen among the carved marbles excavated at Aphrodisias and attributed as an export of an Aphrodisian workshops - cannot reliably be used to determine the origin of a material. Stylistic analysis does not neccessarily identify the marble source or the ethnicity of the craftsmen, but it does point to the craft tradition in which the artisan operated. Many examples throughout this dissertation have shown that the regional marble production centers of Asia Minor produced and distributed carved marbles similar in style to one another. The artistic *koine*

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[627] F. Squarciapino, Leptis Magna (London 1966) 93, 108, 118; J. Ward-Perkins, "Nicomedia and the Marble Trade," Papers of the British School at Rome 48 (1980) 64–68. While Ward-Perkins advances the idea that Aphrodisian craftsmen could have had a hand in the design of the city, he does so skeptically and calls for a reexamination of such a theory.

[628] S. Dillon, "Figured Pilaster Capitals from Aphrodisias," American Journal of Archaeology 101 (1997) 731–69.

characterizing marble production in the Roman empire seems to have been regional, and as exemplified at Aphrodisias, pagan sculptural traditions thrived for centuries. Even so, it is possible that just as marble craftsmen were capable of working in variety of materials, they were also able to produce a variety of styles in different centuries – Metropolitan Roman, Attic, Asian, and Constantinopolitan. To address these issues, we should open the debate on stylistic affinities to include an amalgam of economic, political, social, symbolic, and technological factors. The circulation of craftsmen is important for understanding this phenomenon, and I will consider these networks in more detail below in the section on the social and economic context of marble production.

Quantitative estimates. Finally, a comparison between volumes of exploited stone from marble quarries presents a useful approach for measuring the scale of demand for marble from various production centers. While all the numbers presented here are estimates, they give some idea about the order of magnitude and relative economic importance of marble quarries in relation to one another. Quantitative estimates of quarry output based on work carried out as part of the Aphrodisias Regional Survey allowed for a comparison between the amount of marble removed from all the territorial quarries and the amount consumed within the major civic monuments. The volume of stone removed from the quarries (ca. 120,000 m^3) as reconciled with the nearly commensurate amount used in the city (ca. 125,000 m^3) suggests that export was not a major feature of the Aphrodisian marble industry and that, instead, the local industry was largely self-contained. Likewise, comparisons between quarried volumes and populations of various cities proved helpful. At Ephesus, a city with a population nearly five times the size of Aphrodisias (ca. 100,000 to 15,000), quantitative estimates show that proportion of

population size to volume of stone quarries corresponds well (600,000 m^3 to 125,000 m^3). It also suggests that the trade in Ephesian marbles was incidental rather than a regular feature of the local quarry industry. The volume of stone removed as part of the quarrying enterprises at Dokimeion[629] is comparable to the volume quarried within the territory of Ephesus (650,000 m^3).[630] The status of the Dokimeion quarries should be regarded as export-only since, unlike most quarries, they were never attached to a single city, but to the commissions of building programs in numerous local, regional and international locales. In theory, the amount of marble removed from the Dokimeion quarries was enough to satisfy all the marble requirements of a city the size of Ephesus, one of the largest cities in the Roman empire. Demand reached a similar level at other exporting quarries around the empire; it has been estimated that 400,000 m^3 was removed from Mount Pentelikon;[631] 200,000 m^3 from the largest quarries of Paros;[632] 200,000 m^3 from Euboea;[633] 250,000 m^3 from Chemtou;[634] 220,000 m^3 of granite from Aswan.[635] From these numbers, it becomes clear that quarrying activities employed a significant sector of the population. When all associated quarries have been discovered, these

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[629] J. Röder, "Marmor Phrygium. Die Antiken Marmorbrüche von Iscehisar in Westanatolien," Jahrbuch des Deutschen Archäologischen Institute 86 (1971) 269.
[630] W. Vetters, "Ancient Quarries around Ephesus and Examples of Ancient-Stone Technologies," in P. Marinos and G. Koukis (eds.), The Engineering Geology of Ancient Works, Monuments and Historical Sites Volume 4 (Rotterdam 1990) 2067-2068.
[631] G. Lepsius, Griechische Marmorstudien (Berlin 1890) 13-14.
[632] M. Korres, "The Underground Quarries of Paros," in D. Schilardi, S. Katsarou, D. Katsonopoulou, and C. Brenner (eds.), Paria Lithos: Parian Quarries, Marble and Workshops of Sculpture. Proceedings of the First International Conference on the Archaeology of Paros and the Cyclades, Paros, 2-5 October 1997 (Athens 2000) 74-75.
[633] J. Papageorgakis, "Les Carriers Antiques du Marbre Karystien," Archäologischer Anzeiger 39 (1964) 264-284.
[634] G. Röder, "Numidian Marble and Some of its Specialities," in N. Herz and M. Waelkens (eds.), ASMOSIA I (Dordrecht 1988) 91-96
[635] J. Röder, "Zur Steinbruchgeschichte des Rosen-granits von Assuan," Archäologischer Anzeiger (1965) 467-552.

numbers represent an accurate quantity of an exploited resource. They offer a real opportunity to calculate demand and determine the size of a single industry within the manufacturing sector of the ancient economy.

SUMMARY OF RESEARCH

Quarry Management and Ownership

The actors involved in the marble quarrying industry have come into clearer view throughout the course of this study. Recent archaeological research indicates that numerous quarries were opened in the territory of a city, suggesting a healthy local market for marble. The Aphrodisias Regional Survey has shown that Aphrodisias drew on eight marble quarries in addition to the City Quarries; fifty quarries have been documented in the territory of Ephesus; detailed research on the eight different quarries discovered in the vincity of Sagalassos shows the same patterns of exploitation existed at cities with local limestone resources. In the Hellenistic era, quarries were located very close to the construction site, but in the Roman period, new quarries were opened at greater distances from urban centers.

The increased demand for building materials during the peak periods of urban development in the first and second centuries A.D. was likely a major factor in the decision to open a new quarry. Yet at Aphrodisias, five white marble quarries were opened on the south side of the valley in spite of the fact that the nearby City Quarries were not exhausted and continued to supply high-quality marble well into Late Antiquity. The basic law of supply and demand may be helpful for understanding this surprising

pattern evident not only at Aphrodisias, but also at other cities with marble resources. While the demand for marble had increased, the supply for marble had not, and as a result, the cost of marble and its products increased. Entrepreneurs were willing to risk bringing in marble from much further away, even in spite of the added cost of transport. The most logical explanation for opening new quarries was that quarrymen were simply not able to extract marble quickly enough to supply demand, and that this demand was so high that it remained profitable for those involved in the local marble carving industries to bring in marble from some distance. The sale of marble took place in competitive local markets.

The quality of the stone and the cost of overland transportation were likely the main factoring in establishing the price for marble, and it is important to note that a hierachy of quality appears between the individual quarries surrouding Aphrodisias. In the quarries on the south side of the valley, the variable joint spacing due to fracturing in the stone made it difficult to extract large blocks. This variability within the southern quarries impeded large-scale exploitation. None ever reached the size of the City Quarries, which provided higher quality marble more consistently, and for a longer period of time. The unfractured marble from the Yazır quarry represents the highest quality of any from the local quarries. It was used to supply monolithic columns to building projects at Aphrodisias beginning in, and perhaps limited to the second century A.D. Thus, a picture of mixed-quality exploitation emerges, and it is possible to imagine scenarios in which owners of a certain quarry owners went bankrupt, earned a steady income, or grew rich.

Quarry landowners included private individuals, sanctuaries, and the state. Quarries in the territories of marble-rich cities were owned and operated at different

times by a mixture of all of these types of landowners. This reconstruction is based on written sources, and this evidence does not support the dominance of one form of landowner over another. Roman legal sources, solely concerned with private property, suggest that private entrepreneurs regularly engaged in the sale of marble. Private landowners earned money from the exploitation of mineral resources located on their land; and the legal sources indicate that even though quarrying activities were secondary to agricultural productivity, the desire to earn a sustainable income and avoid a deficit were the foremost concerns in the landowner's decision to open and run a quarry. If it is true that quarrying did not generate large sums of money, those involved must have accepted smaller profits with the understanding that the quarries would produce a steady income over a longer period of time.

As early as the Hellenistic period, temples leased out their land to private individuals to generate revenues and ensure a stable income for the maintenance of the cult. Although there is no direct evidence for temples leasing out quarry operations to small-scale entrepreneurs, it is striking that both Aphrodisias and Ephesus were major cult and marble-carving centers. The temple was an important landowner in the territory of these cities, making it likely that quarries were a part of a sanctuary's estate.

The example of the black and white marble quarry at Göktepe, which lay well outside the territory of Aphrodisias, fits within this model of mixed quarry-ownership. The hallmarks of imperial oversight – the Greek and Latin tracking marks inscribed on the blocks, circular impressions for the fitting of lead imperial seals, and on-site housing for laborers - indicate that the state may have either opened or taken over the quarry for a certain period of time to extract marble for its own purposes. In the region of Phrygia,

epigraphic evidence from Dokimeion suggests that the quarrying administration and operations there were largely under imperial control, but that the state regularly leased out quarrying operations to private contractors.

Cities as marble consumers

The research presented in this dissertation suggests that the luxury marble trade outside of Rome is not as exceptional as generally thought. Benefactors of civic monuments tapped into international-exporting quarries mainly associated with imperial architecture in the capital of Rome since the display of these prestigious marbles conveyed notions of access and status most vividly. Participation in international trade networks was deeply embedded in the urban fabric of Asia Minor; nevertheless, the region had obvious advantages given its proximity to a number of exporting quarries. Geography, geology, economic integration, civic competition, finances, and personal networks all shaped a city's participation in the marble trade.

Ephesus' coastal location and its position as the land-route terminus for Dokimeion marbles gave the city unusual access to imported marbles from across the Mediterranean. The bulk of colored marbles came from Asia Minor and Greece, but also from further afield in Egypt and North Africa. At least 30 different types of decorative stone were used in 11 different public buildings in Ephesus, and Dokimeion marbles were used in at least eight. As a medium-sized city situated along a major trade route, Sardis participated in the regional marble culture to a considerable degree, and its proximity to the exporting quarries of Asia Minor accounts for the majority of marbles imported to the city. In large part, the marble-poor cities of Pisidia participated in the marble trade

because Dokimeion marbles were regularly traded along routes that passed by their cities. Aphrodisias imported fewer marbles than any of the cities surveyed in this study; the city eschewed expensive imports in favor of its own local and well-supplied colored sources. Geographic isolation from trade networks also helps to explain why the city was nearly self-sufficient in all aspects of its economy.

Expensive colored imports were reserved for lavish public building projects. Colored marble revetment was widely available in the regional markets of Asia Minor. Colored monolithic columns were used more sparingly, and importation must have been subject to considerations of cost, logistics, and personal connections. This was reflected in the output of the exporting quarries where the volume of material quarried for revement would have exceeded the volume of material quarried for monolithic columns. While there is no way to quantify the proportion of material quarried for different types of marble objects, generalized quantitative estimates are again helpful for assessing the scale of demand. At Ephesus, 209 monolithic columns made from Troad granite were used in the Tetragonos Agora (this consumed around 1,100 m^3 of marble), and 16 monolithic columns from Dokimeion adorned the smaller building project of the Library of Celsus (around 50 m^3). Given that the annual average of serial numbers recorded on quarried blocks at Dokimeion was 250, it is possible to see how one or two building projects in one city could consume the annual rate of production within a single quarry.[636] Bath-gymnasia, the *scaenae frons* of theaters, and nymphaea seem to have required colored marbles for architectural adornment. Nearly every major city in Asia Minor

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[636] A. Hirt, Imperial Mines and Quarries in the Roman World: Organizational Aspects 27 B.C. – A.D. 235 (Oxford 2010) 223.

could claim these types of buildings, and nearly every one surveyed in this study displayed imported materials of some sort. Demand must have put great strain on operations in the major exporting quarries, neccessitating a larger workforce and a greater level of administrative organization as evidenced on labeled blocks within the quarries.

The trade of marbles within Asia Minor reveals a highly-connected economic region within the Roman empire. The epigraphic evidence underscores the web of personal connections that existed in towns across Asia Minor to supply cities with prestigious marble goods. In Ephesus, Gauis Flavius Furius Aptus, who decorated his semi-official and luxurious downtown apartments with 30 different types of marble revetment, seems to have had direct access to materials sold from the imperial quarries, as shown through the preservation of his name in red paint on the back of a block of Dokimeion revetment. Yet access was not limited to high ranking officials or members of the aristocratic elite. At Hierapolis, an inscription on the architrave of the theater's *scaenae frons* attests that "the corporation of purple dyers also contributed towards the ornamentation of both the first and the second story, worked in Dokimeion marble."[637] This craft guild of purple dyers formed a powerful union, wealthy enough to buy materials from the exporting quarries. A survey of the patterns of marble consumption provides an index of civic wealth, economic connectivity, and aspirations under Roman rule.

Cities as marble suppliers

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[637] D. Attanasio and P. Pensabene, "I Marmi del Teatro di Hierapolis," Hierapolis. Scavi e Ricerche 4 (Rome 2002) 69-85.

Cities actively explored and opened a range of resources in their territories, targeting both white and special, colored sources. At Aphrodisias, colored marbles were exploited both because they resembled internationally famous sources at Dokimeion, and because they offered economic advantages that allowed the city to use local stone in the same manner that others did at great expense with imported materials. The fine-grained blue-gray marbles were used for special commissions, such as the "Blue Horse." Beginning in the second century A.D., the Yazır Quarry supplied the city with the mottled blue and white marble used for monolithic columns for both civic and monumental private building projects. The black and white marble from Göktepe was quarried for specific categories of marble goods, such as monolithic columns, and somewhat more unusually in the Late Antique period for small, decorative statuettes and commissions of high-ranking officials. At Ephesus, the blue and white streaky marble, was also targeted as an alternative to expensive imported materials and for its resemblence to the famous source from Hippo Regius in North Africa. At Sagalassos, the availability of colored sources of pink, beige, and green limestones let the local builders display polychromatic architecture usually associated with colored marbles.

The archaeological record bears witness to the emergence of a niche market for colored marbles; many of these were substitutes for famous sources, indicating that buyers kept abreast of and wanted to participate in empire-wide trends, especially from the second century A.D. onwards. Colored marbles were prized and valued according to their visual appearance, scarcity, and symbolic associations. The trend for embellishing architecture with colored marbles spread to other media as well; wall paintings and mosaics imitated famous colored marbles. Some of the local enterprises that exploited

locally available resources attracted the attention of buyers in neighboring and even state-run markets, and it is within this context that the intra-, inter-, and supra-regional distribution of select colored sources should be seen. The volume of some of the colored sources investigated in this study – including the black and white Göktepe quarries, the streaky blue and white marbles from Ephesus, as well as the alabaster quarries in the territory of Hierapolis - suggest that exploitation exceeded local usage. Nevertheless, most of these quarries produced around 10,000 m^3 of usable stone, and thus reflect a modest scale of exploitation, and relatively restricted demand, especially in comparison to the largest exporting quarries of the Roman world. If a marble acquired a degree of fame and was located in a place favorable to trade, it seems that marble-rich cities could export their resources, but that they did so in limited quantities. In general, the products of most quarries achieved only local or regional distribution.

Unsurprisingly, the value of white marble was lower than that of colored marbles since it was abundantly available in many locations within Asia Minor, and in other locales across the empire. Strabo reaffirms this view in the capital: "For at Rome are to be seen monolithic columns and great slabs of the variegated marble; and with this marble the city is being adorned both at public and at private expense; and it has caused the quarries of white marble to be of little worth."[638] Recent technological analyses have shown that many architectural elements and, in particular, sculptures, were painted, stuccoed or gilded and that their original surfaces would have been entirely obscured. Additionally, white marble was regularly used as an alternative to bronze statuary because it provided a cheaper and less labor-intensive alternative to the expensive and

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[638] Strabo, Geography 9.437.

complicated bronze casting process. Locally available white marble was not valued as much as a raw material, but for the finished, carved product in which the local craftsmen specialized. In exporting white marble quarries, Proconnesian and Dokimeion workshops met consumer demand through the serial production of specific types of sarcophagi. Incidental trade in white marbles from cities such as Ephesus and Aphrodisias did occur, but on a very limited basis. Excavations at Aphrodisias suggest that the Aphrodisian ateliers regularly produced statuary of Hellenistic mythological themes at various scales.[639] The importation of the colossal statues of Dionysos made in Aphrodisian marble to the city of Sagalassos may reflect Aphrodisian sculptors' reputation for producing this genre of sculpture, but is also underscored by the fact that Sagalassos had no marble resources of its own. White marble from Ephesus may have been exported to Pergamon, Perge, and Carthage. This, however, was not the norm and marbles from Ephesus may have been shipped out because of Ephesus' unusual status as a transport center and commercial harbor for marble goods.

Social and economic context of marble production

Quarrying activities involved a significant portion of a population, and I have focused on those who were given the greatest opportunities for advancement within Roman society. This addresses the prevailing assumption that the rewards from non-agricultural production went mainly to artisans of a humble social status, and that the entrepreneurial class never rivaled the landed gentry, who remained more interested in

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[639] R. Smith, "Hellenistic Sculpture under the Roman Empire: Fisherman and Satyrs at Aphrodisias" in O. Palagia and W. Coulson (eds.), Regional Schools in Hellenistic Sculpture (Oxford 1998) 253-260.

generating profits from the exploitation of resources on their land than from the manufacture and distribution of raw materials.[640]

That the iconography of marble carving was frequently depicted in funerary monuments from marble production centers highlights the social and financial benefits these activities had to the local inhabitants. At Dokimeion, stone masonry tools decorate a number of funerary stele. At Ephesus and Aphrodisias, sarcophagi show marble carvers at work in their studios.[641] On the sarcophagus from Ephesus, several boys run in a gymnasium race; Smith has interpreted this as an upwardly-mobile workshop owner's expression of pride at being able to send his children to a gymnasium. The decision to portray these scenes shows that marble-carving generated profit, or at least enough for the local artisans to be able to afford their own tombstones.

Throughout this study, a special class of marble artisans – those who signed their works – has been singled out for several reasons. First, because the practice of signing in antiquity was rare, scholars have granted a measure of fame to these ancient sculptors;[642] secondly, the signatures document the networks in which these artisans circulated; thirdly, because the practice was inconsistent, there was an even larger group of artisans who were mobile. Greek sculptors signed their works as early 630 B.C., and select sculptors could become citizens, be rich and well-educated, circulate with the elite, and be honored

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[640] D. Kehoe, "The Early Roman Empire: Production" in W. Scheidel, I. Morris, and R. Saller (eds.), The Cambridge Economic History of Greco-Roman World (Cambridge 2008) 543-569.
[641] Ş. Karagöz, "Zur Lokalisierung einer Marmorwerkstätte in Ephesus," in P. Scherrer, H. Taeuber, and H. Thür (eds.), Steine und Wege (Wien 1999) 55-59; R. Smith, "Marble Workshops at Aphrodisias," in F. D'Andria and I. Romeo (eds.), Roman Sculpture in Asia Minor. Journal of Roman Archaeology Supplementary Series 80 (Ann Arbor 2011) 66-68.
[642] J. Marcadé, Recuil des Signatures de Sculpteurs Grecs II (Paris 1957); B. Ridgway, Hellenistic Sculpture II (Madison 2000); B. Ridgway, Hellenistic Sculpture III (Madison 2002).

in public for their work.[643] In Hellenistic Asia Minor, Ephesian artists used their origins as a marketable claim while working away from home. The practice endured into the Roman period; signatures of Aphrodisian, Athenian, Dokimeion, Nicomedian, and Proconnesian marble-workers have been found on a variety of marble objects throughout the empire. Yet artisans of the Roman period did not attain a high status as regularly as their Greek counterparts. Most came from humble origins, and they were presumably slaves or freeborn members of Greek communities without Roman citizenship. The fourth century A.D. Aphrodisian sculptor Flavius Zeno, a private citizen honored as a priest of the imperial cult, who both made and gave a statue in his own name shows that an artisan could gain a measure of social standing.[644] Marble carvers from Asia Minor signed works intended for export, and these signatures represented a quality assurance earned by the creation of high-quality craft goods. Sculptors ascribed value to their work in ways that reflected Hellenistic traditions. I interpret these signatures as craftsmen acting as private entrepreneurs, responding to consumer demand and the needs of their patrons in markets both at home and abroad, and it is within this context that we can understand the impetus behind being either itinerant or permanently moving away from home.

This study has also shed light on the ways in which marble carvers operated. An examination of Sagalassos and Pisidian Antioch has shown that the demand for those with carving skills in marble-poor cities was great; signatures of Dokimeion artisans are attested in both cities. These sculptors may have shipped fully-finished statues from their

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[643] N. Spivey, Understanding Greek Sculpture: Ancient Meanings, Modern Readings (London 1996) 159-160.
[644] P. Stewart, The Social History of Roman Art (Cambridge 2008) 19-20.

home workshop at Dokimeion, or workers could have traveled with their local materials to complete the work at the commission site. It is possible that sculptural workshops in marble-poor cities were established to support regional demand by relying on imported materials. Experienced and well-connected artisan(s) from established marble workshops may have permanently stationed themselves in a marble-poor city and trained locals as assistants to satistfy a steady demand for sculpture; or a person from Sagalassos or Pisidian Antioch may have embarked on an apprenticeship at a nearby regional marble workshop, and come back to his hometown to set up a studio. Evidence from Pisidian Antioch provides an example of how an export system could have been set up by individuals with connections to quarries to supply these newly-founded workshops with marble on a regular basis.

The study has also shown that Aphrodisian sculptors acted in ways that were largely typical of artisans from Asia Minor. Yet the city remains exceptional in several ways. First, the epigraphic and archaeological evidence preserved at the site, the results of continuous excavations, and the discovery and analysis of new quarries from both the Aphrodisias Regional Survey and the Italian expedition allow for more in-depth interpretation of Aphrodisias' marble culture than elsewhere. Second, the nearly 40 inscribed signatures from Italy, Greece, Crete, and Asia Minor, as well as at Aphrodisias, represent a proportionally larger number of signatures than that found in any other marble production center. The public sculptural competitions held within the city – a unique attestation - indicate that Aphrodisians held their local craft tradition in unusually high esteem. This may suggest that Aphrodisian sculptors may have signed more regularly than others from the Greek East, or that they simply may have circulated in broader

networks – an important implication for this study. It is possible to gauge the size of the workforce involved in making freestanding statuary. Smith has estimated that around 1,000-2,500 portrait statues were produced over a 250 year period, and that four to ten were made annually.[645] The volume estimates of the sources from the regional quarries suggest that the Aphrodisian marble industry was used for local civic adornment and that local artisans were engaged with local commissions. The rate of sculptural production and the number of artisans active in the sculptural workshops suggest a small cohort of local sculptors, and those active at home certainly outnumbered the even smaller group of Aphrodisian craftsmen working abroad. Yet the connections between Göktepe marble and Aphrodisian sculptors suggest that ties to this quarry may have been instrumental in launching the careers of Aphrodisians abroad, showing how Aphrodisian sculptors, trained in a local tradition of fine carving, were chosen to carry out imperial commissions. This in turn brought recognition to Aphrodisias in general as a center for high-quality sculpture production. If Aphrodisias represents a place mostly typical of other marble production centers, it seems that the most-specialized and talented of artisans were likely to have been the most well-traveled. The highly-successfully entrepreneurial class of marble artists probably represented a minority of marble craftsmen. As a small and fragmentary segment within Roman society, they could not contribute to the Roman economy in ways that were comparable to the larger class of aristocrats who generated far more wealth from land productivity.

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[645] R. Smith, S. Dillon, C. Hallett, J. Lenaghan, and J. Van Voorhis, Aphrodisias II. Roman Portraiture from Aphrodisias (Mainz 2006) 9–13.

In conclusion, the amount of money spent on public adornment of cities may have in fact caused economic growth in the Roman Empire to stagnate; quarrying came at a great cost and the investment in building did not generate productive wealth.[646] Pliny the Younger's complaint that the citizens of Nicomedia and Nicaea were bankrupting themselves on account of their profligate spending on public buildings indicates that these activities could be thought to cause more economic harm than good.[647] In other words, Dio Chrysostom seems to have been correct when he said that a wealth in marble resources contributed little to the overall civic prosperity. Quarrying marble for export required an enormous investment of resources; only the state could afford to pour in capital to support an infrastructure in the marble trade over the long-term, which involved not just the operations of quarries, but requisitioning animals for overland transportation, and building ships strong enough to bear the load of marble cargoes.

The marble-rich cities of Asia Minor produced a large class of marble artisans, who enjoyed the monetary benefits that came with the demand for their skills. The cultivation of an architectural and sculptural carving-tradition fostered the conditions for social mobility for select sculptors whose exceptional skills allowed them to begin on projects in local quarry or city workshops, and embark on international careers. Artisans relied on marbles available in the place of commission, in their new homes, or on materials easily accessible from international exporting quarries; but for the most part, the exportation of marble outside of a city's territory did not play a major role in the civic economies of Asia Minor. Marble carving centers like Aphrodisias and Ephesus

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[646] D. Kehoe, "The Early Roman Empire: Production," in W. Scheidel, I. Morris, and R. Saller (eds.), The Cambridge Economic History of the Greco-Roman World (Cambridge 2008) 550.
[647] Pliny the Younger, Letters 10.34 and 10.37.

benefited from the international reputation of their locally-produced artists, they did not have the resources to invest in large-scale shipment of a material such as marble. The greatest asset of marble resources in Asia Minor was the opportunity for civic beautification on a local level.

The circulation of marbles and artisans fits into the economic model described by Paterson:

> the micro-economies of the Roman Empire with their own natural rhythms and structures were designed to meet local needs…But at certain periods, some of these economies become more closely linked with the wider world and find a wider market for their goods.[648]

This study has focused on most intensive periods of of marble exploitation - from the first to fourth centuries A.D. – and has charted the varied historical and economic circumstances behind, and the consequences of, the demand for marble. This commercialization of marble is most obvious in the second century A.D. Even so, the interest in marble that reached a pinacle in the Roman period began in the context of the Greek city-states, and marble-working traditions were deeply embedded in the region of Asia Minor. This legacy continued to resonate even into the Byzantine and Ottoman empires where imperial architecture in the form of churches, mosques, and palaces displayed newly quarried and reused marbles that were made famous in antiquity.

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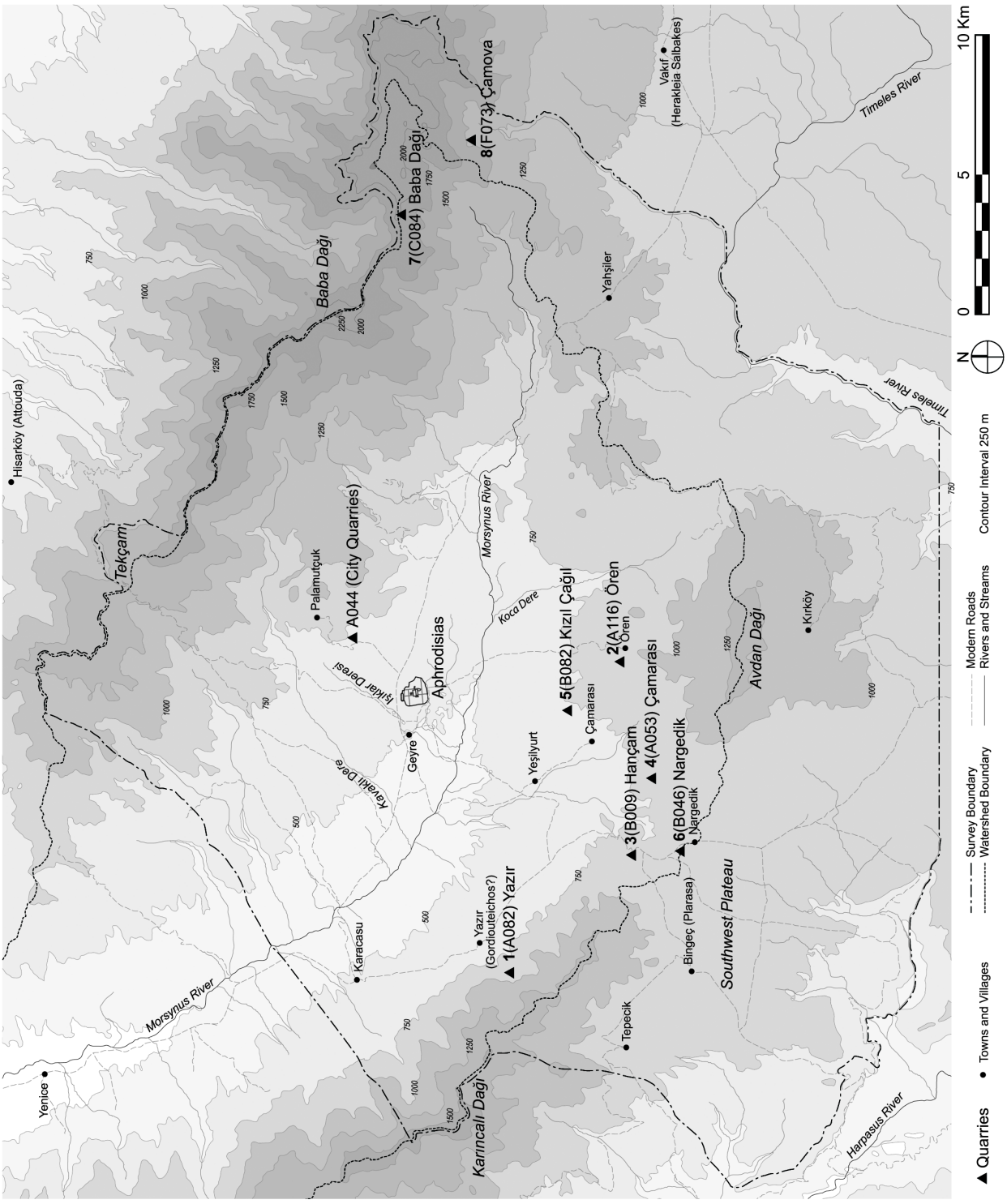
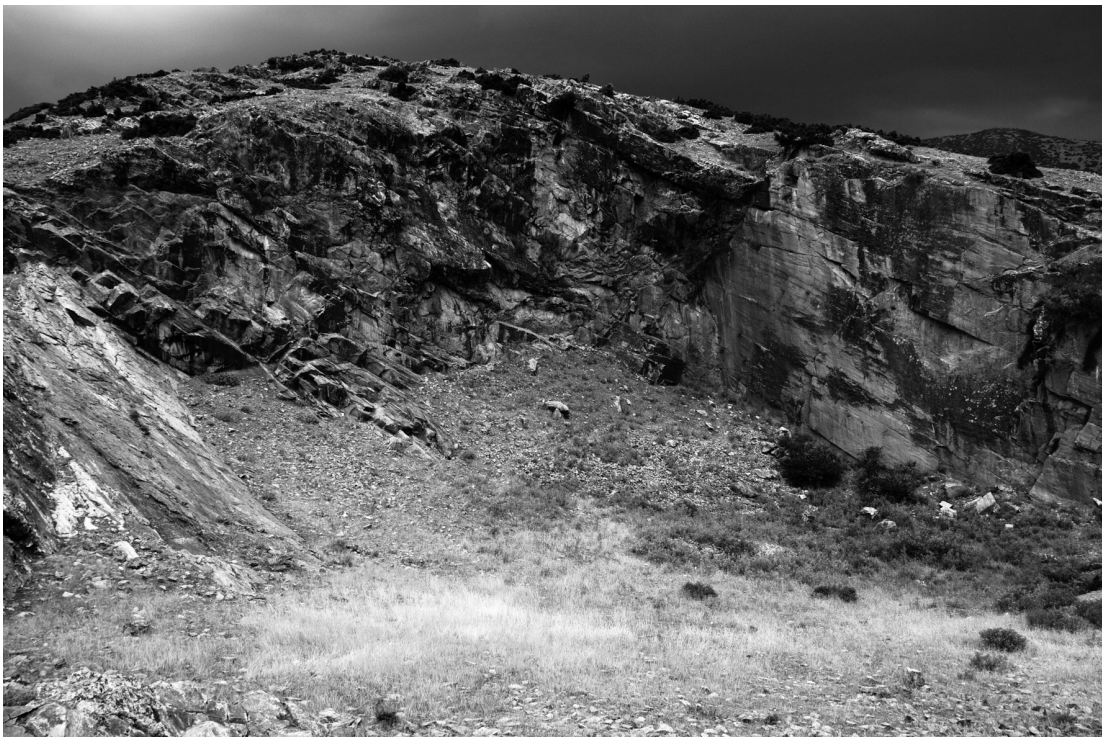
[648] J. Paterson, "Trade and Traders in the Roman World: Scale, Structure, and Organization," in H. Parkins and C. Smith (eds.), Trade, Traders, and the Ancient City (London 1998) 164.

FIGURES

1.1. Map of case studies in the dissertation.

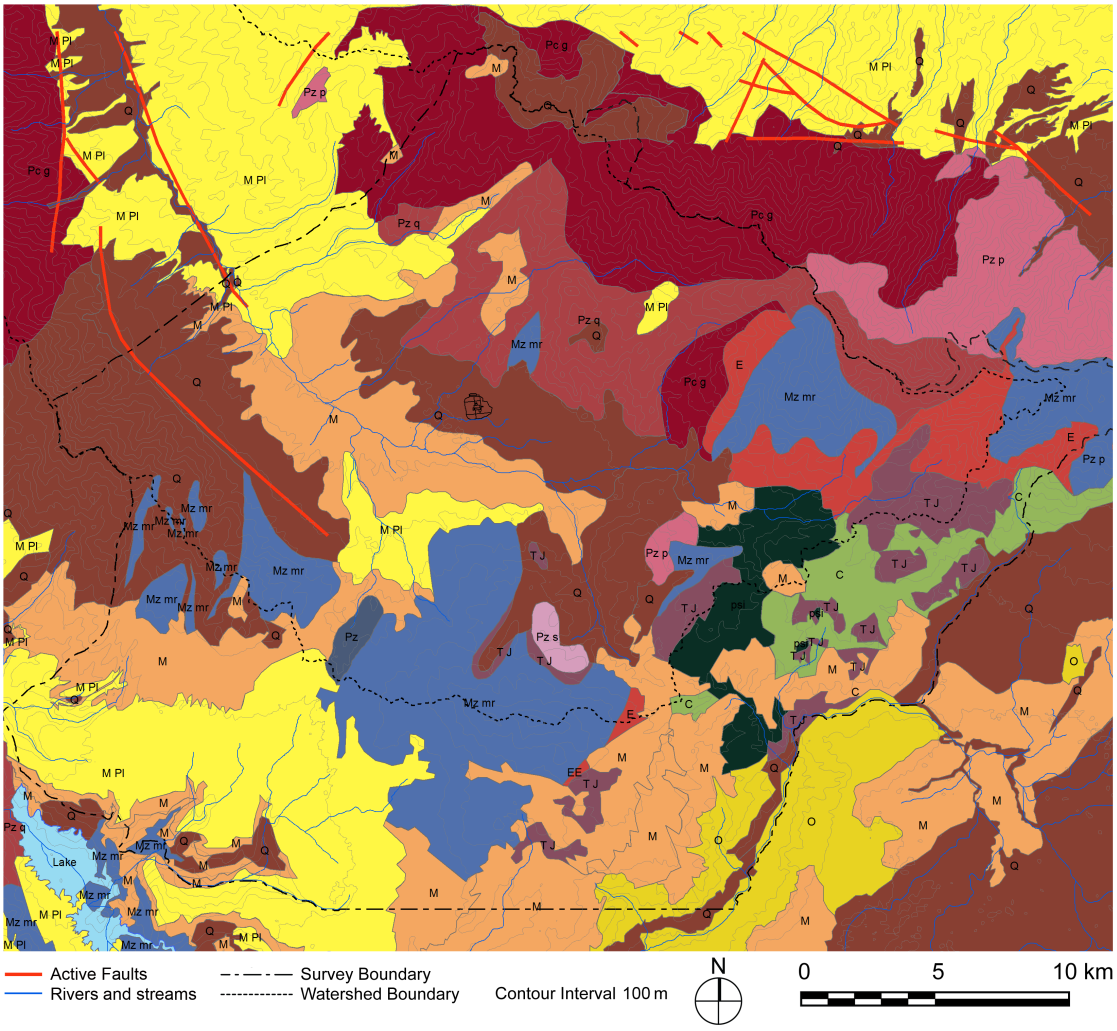


3.1. Map of Aphrodisias Survey region, showing locations of quarries (1:200,000).



3.2. Largest quarry in City Quarries complex. Photo: Benjamin Swett.

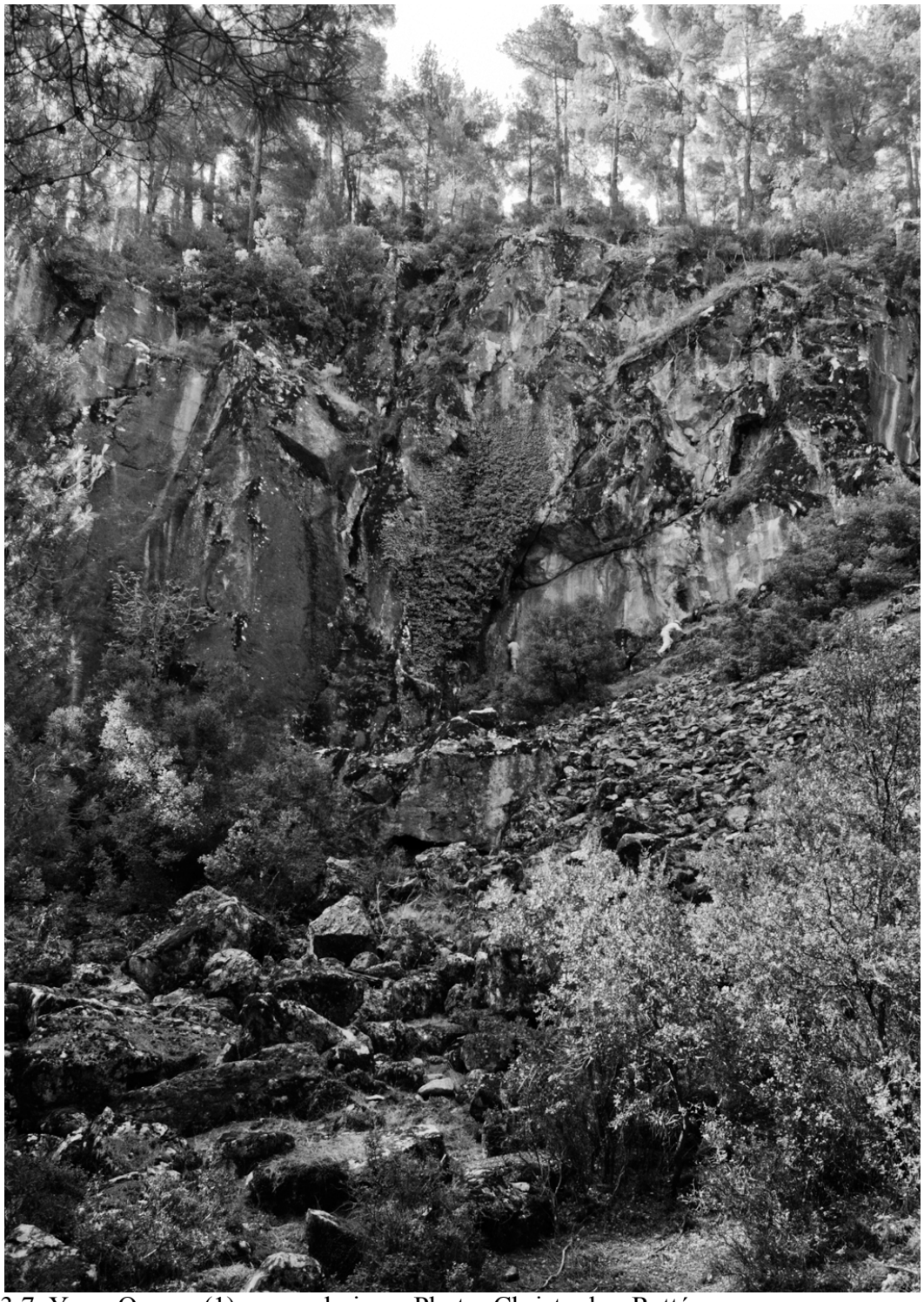
3.3. Demirağlar marble quarrying operations (2007). Photo: author.



3.4. Geological map of the Aphrodisias region (1:400,000).

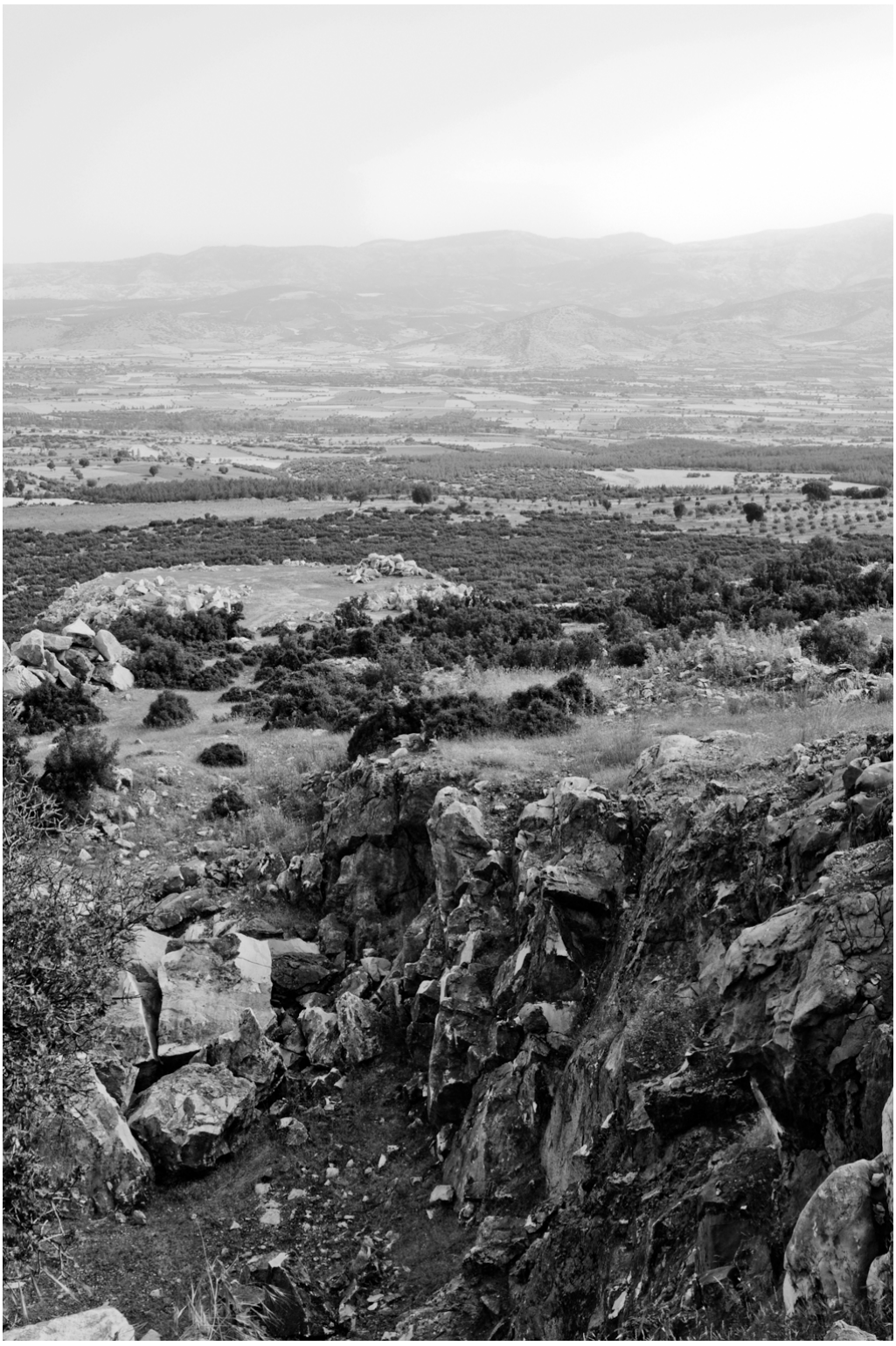
3.5. View of Baba Dağı Quarries (7), looking southwest over the upper Morsynus valley.

3.6. Çamova Tepe Quarries (8). Photo: author.



3.7. Yazır Quarry (1), general view. Photo: Christopher Ratté.

3.8. Yazır Quarry (1), detail showing marble color. Photo: author.



3.9. Hillside quarry at Kızıl Cağıl (5). Photo: author.

3.10. Small pit quarry at Hançam (3). Photo: author.

3.11. Çamarası Quarry 1 (4). Photo: author.

3.12. Slipways at Hançam (3). Photo: author.

3.13. Pit Quarry 4 at Nargedik (6). Photo: author.

3.14. Abandoned blocks at Baba Dağı Quarries (7). Photo: author.

3.15. Face of Çamarası Quarry 1 (4). Photo: author.

3.16. Separating trenches at Hançam Quarry 3 (3). Photo: Benjamin Swett.

3.17. Traces of removed block at Hançam Quarry 3 (3). Photo: Benjamin Swett.

3.18. Fine-point chisel marks preserved at Ören Quarry 7 (2). Photo: Benjamin Swett.

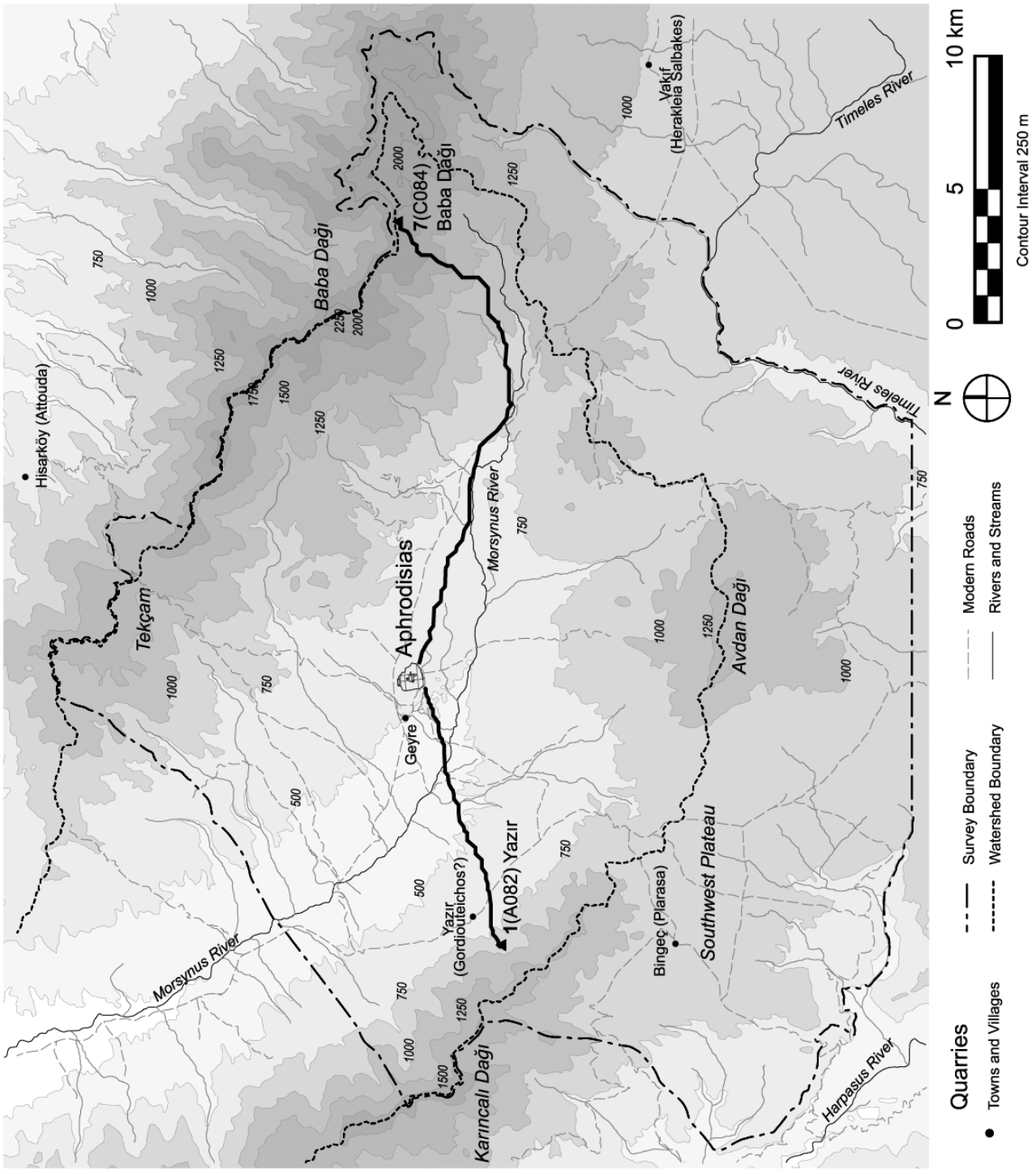

3.19. Separating trenches and erratic pickmarks on main quarry face at Hançam Quarry 2 (3). Photo: author.

3.20. Worked face at Hançam Quarry 2 (3). Photo: author.

3.21. Worked floors at Ören Quarry 7 (2). Photo: author.

3.22. Kızıl Cağıl emery pit. Photo: author.

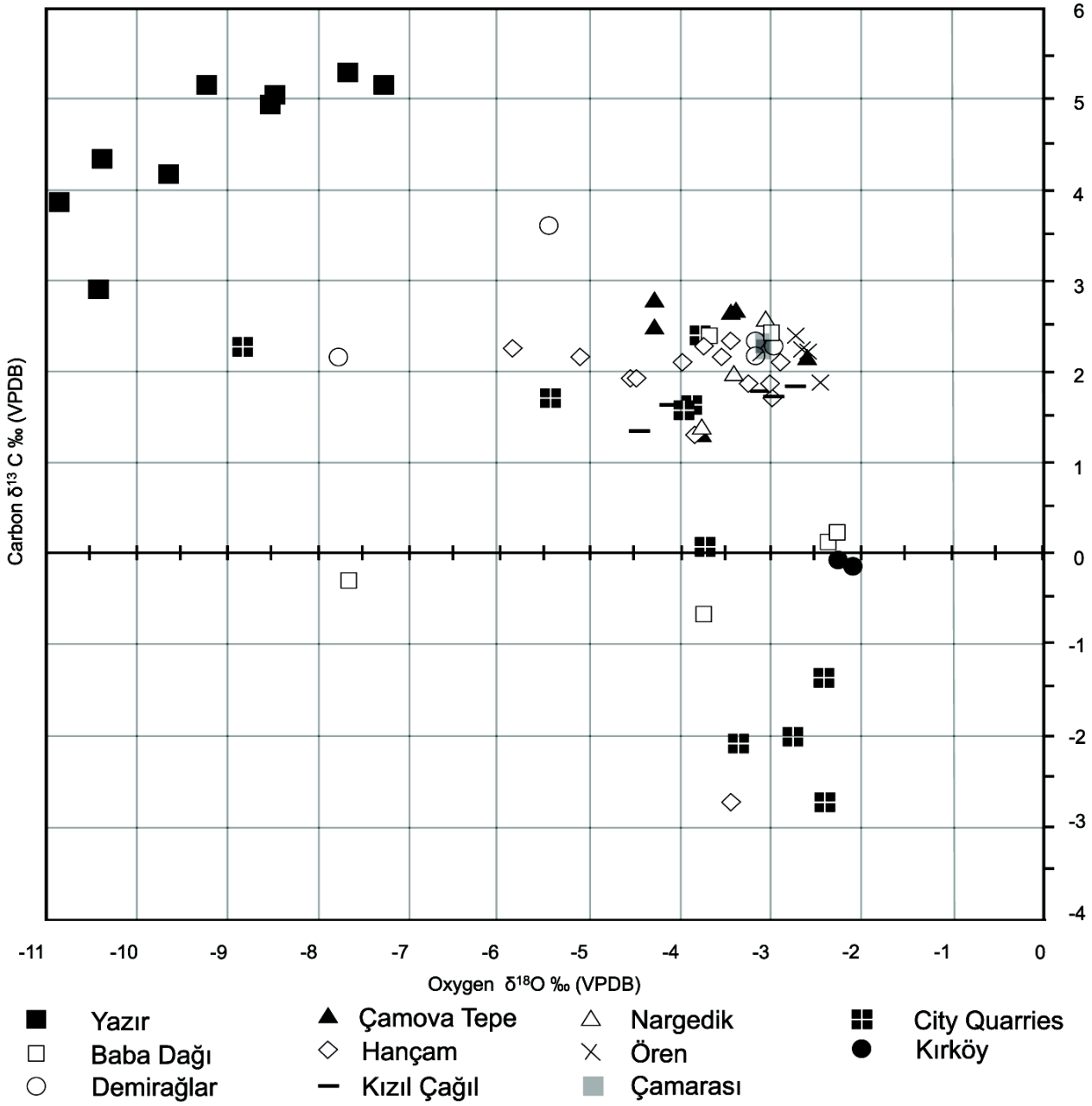
3.23. Yazır slipway (1). Photo: author.



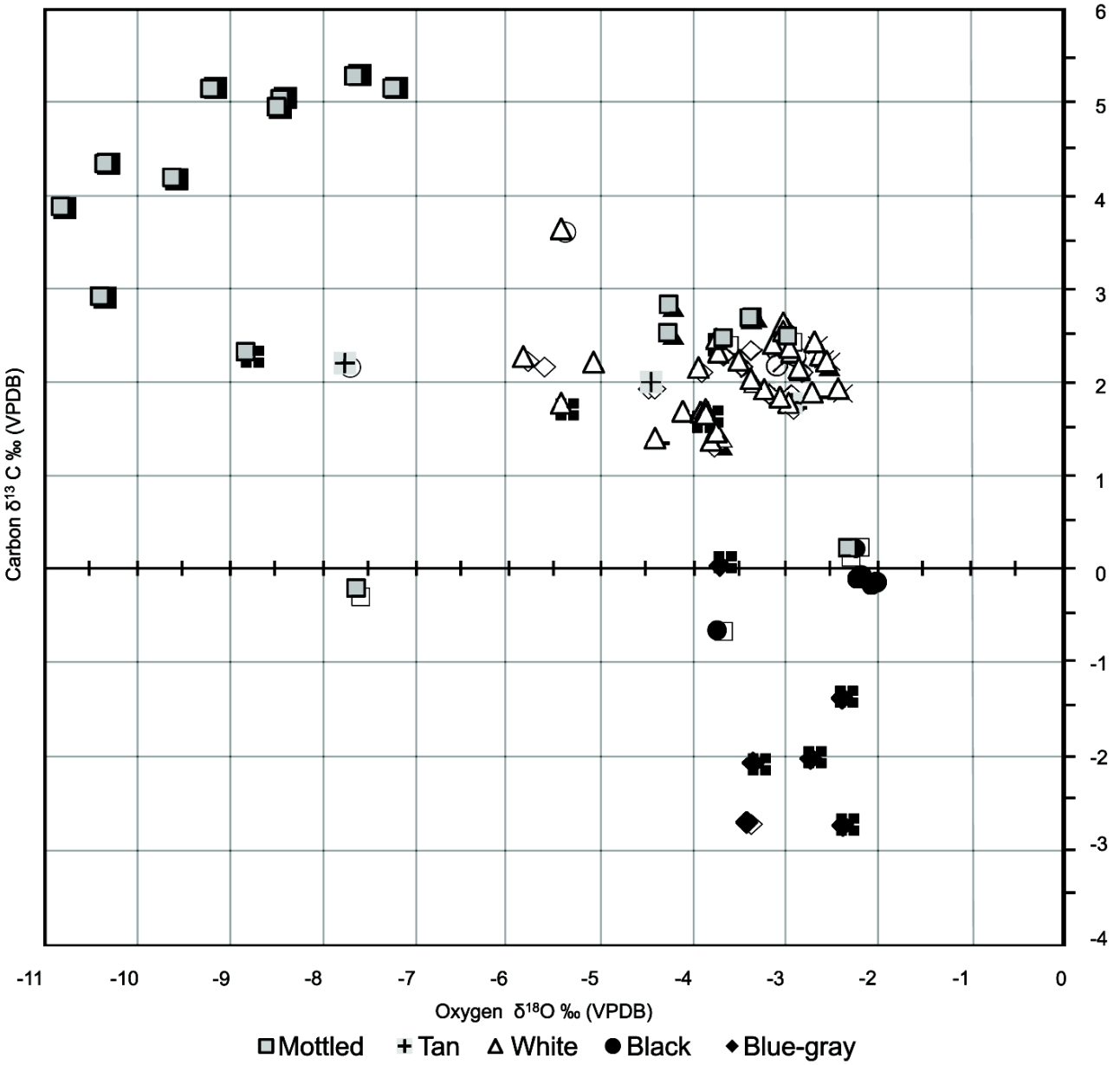
3.24. Reconstructed routes from Yazır and Baba Dağı Quarries to Aphrodisias (1:400,000).

3.25. Abandoned sarcophagus chest at Çamarası (4). Photo: Christopher Ratté.

3.26. View of spoils deposited on perimeter of City Quarries. Photo: Trevor Proudfoot.

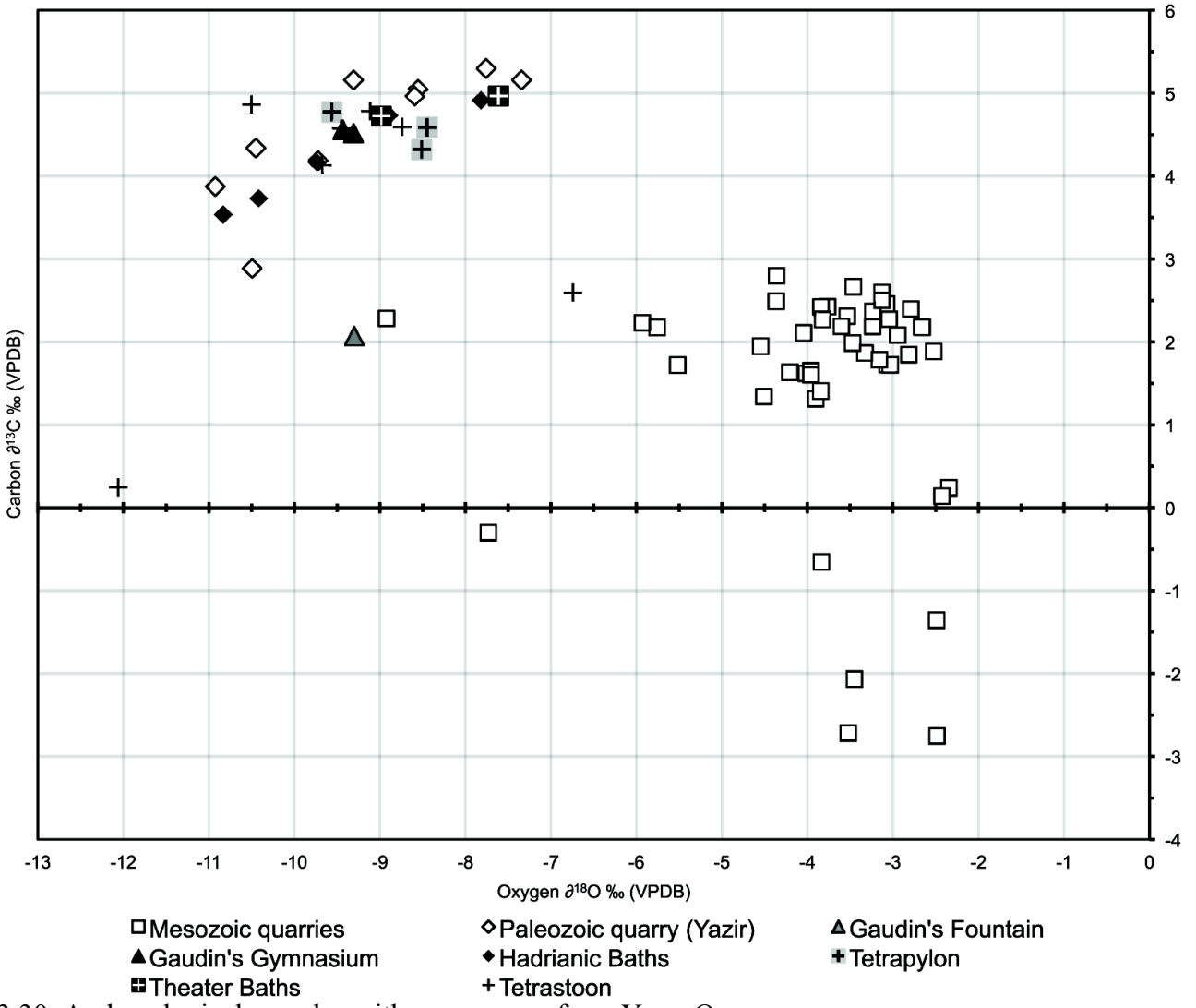


3.27. Carbon and oxygen isotopes from Aphrodisias marble quarries, by quarry.

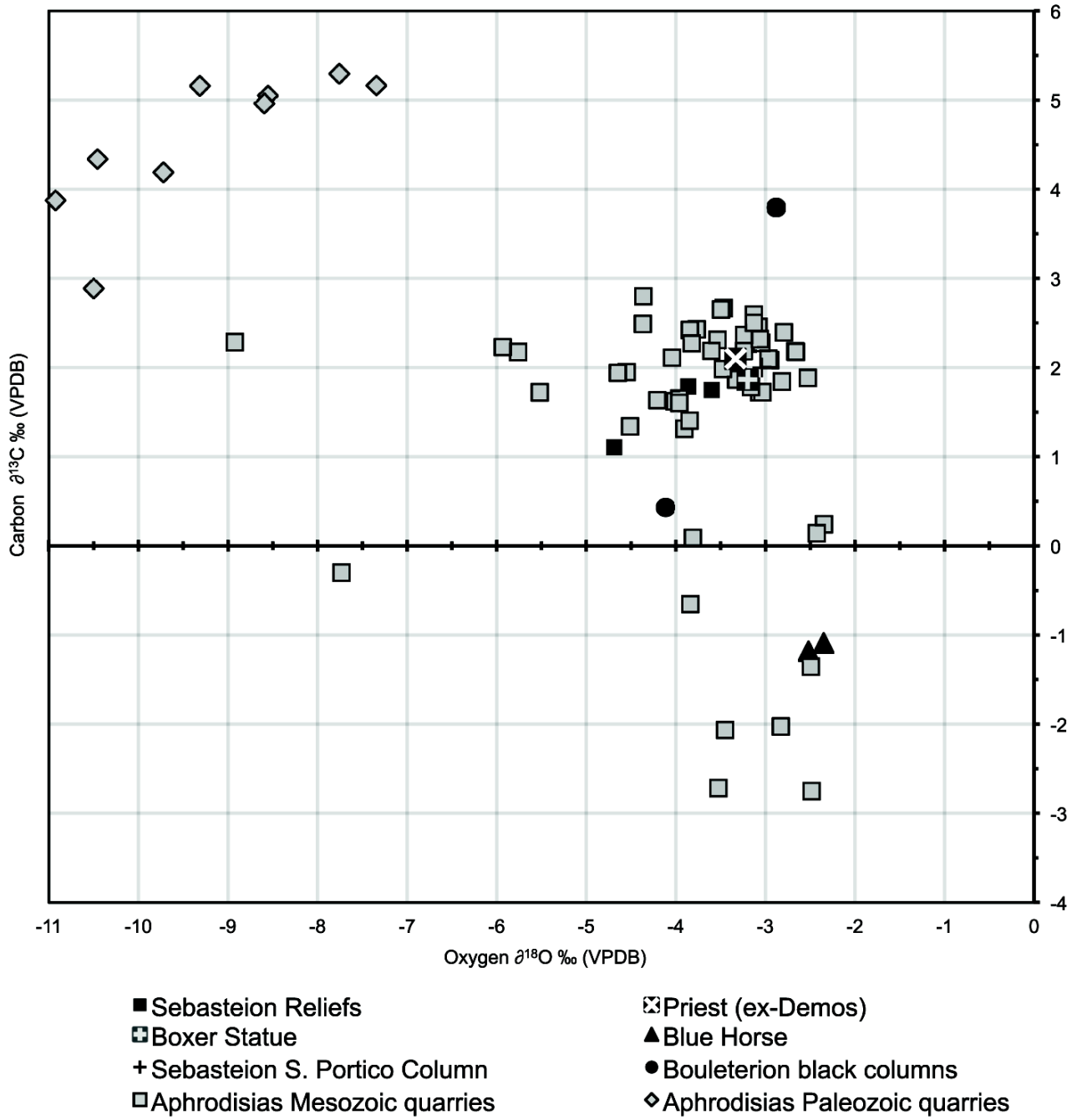


3.28. Carbon and oxygen isotopes from Aphrodisias marble quarries, by color.

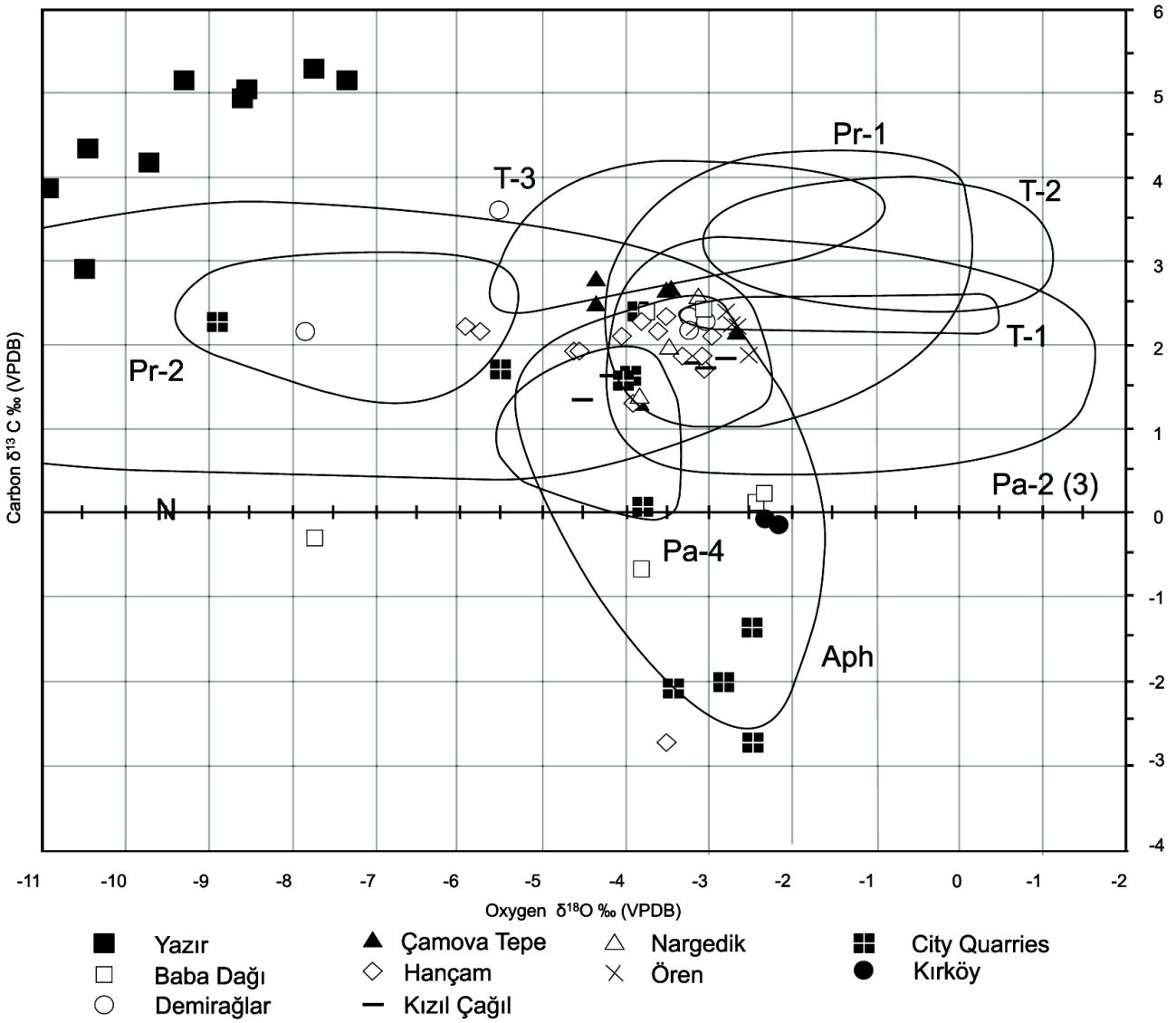
3.29. Theater Baths with a view of monolithic columns from Yazır. Photo: Benjamin Swett.



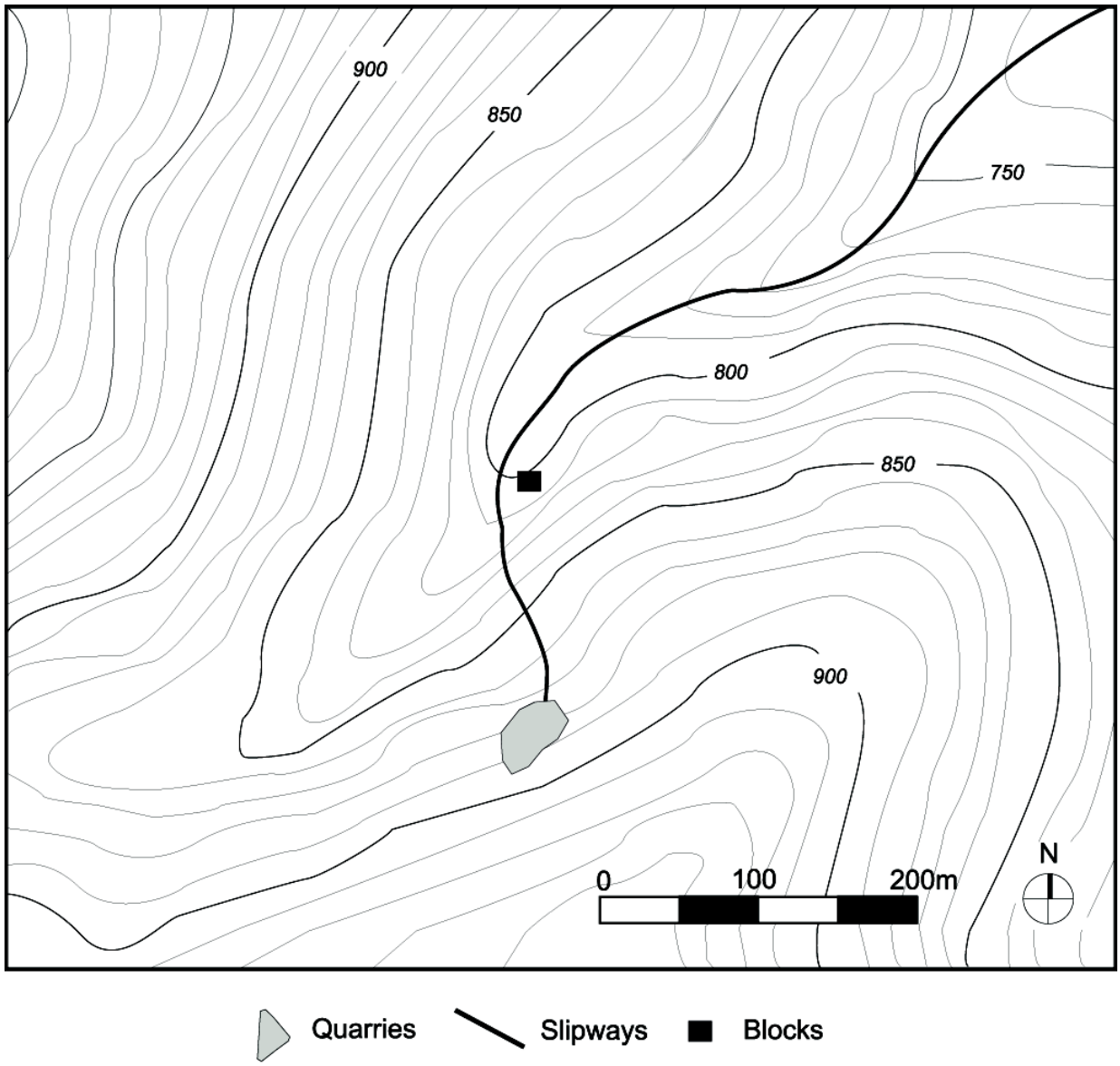
3.30. Archaeological samples with provenance from Yazır Quarry.



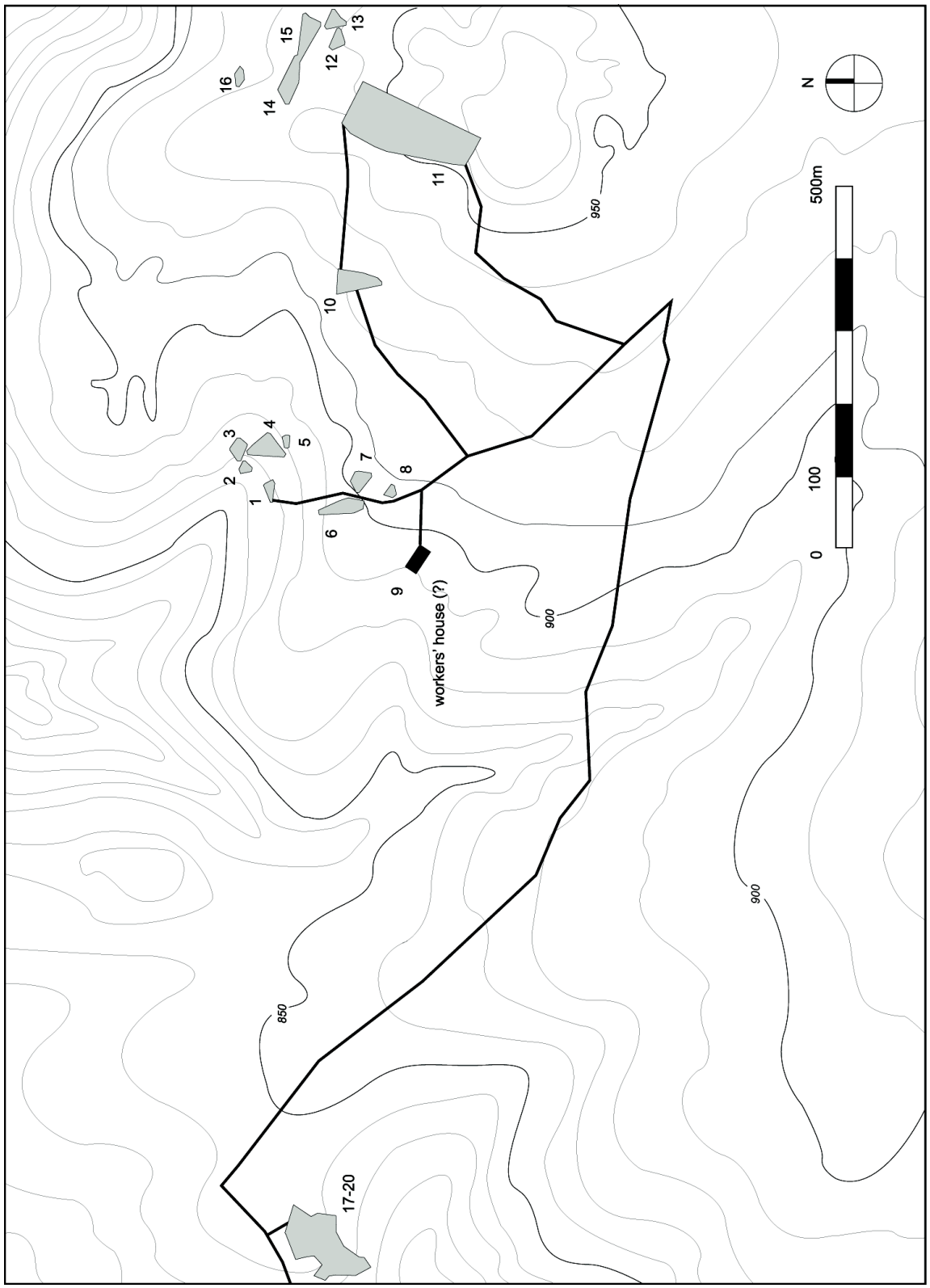
3.31. Archaeological samples of blue, black, and white marbles.



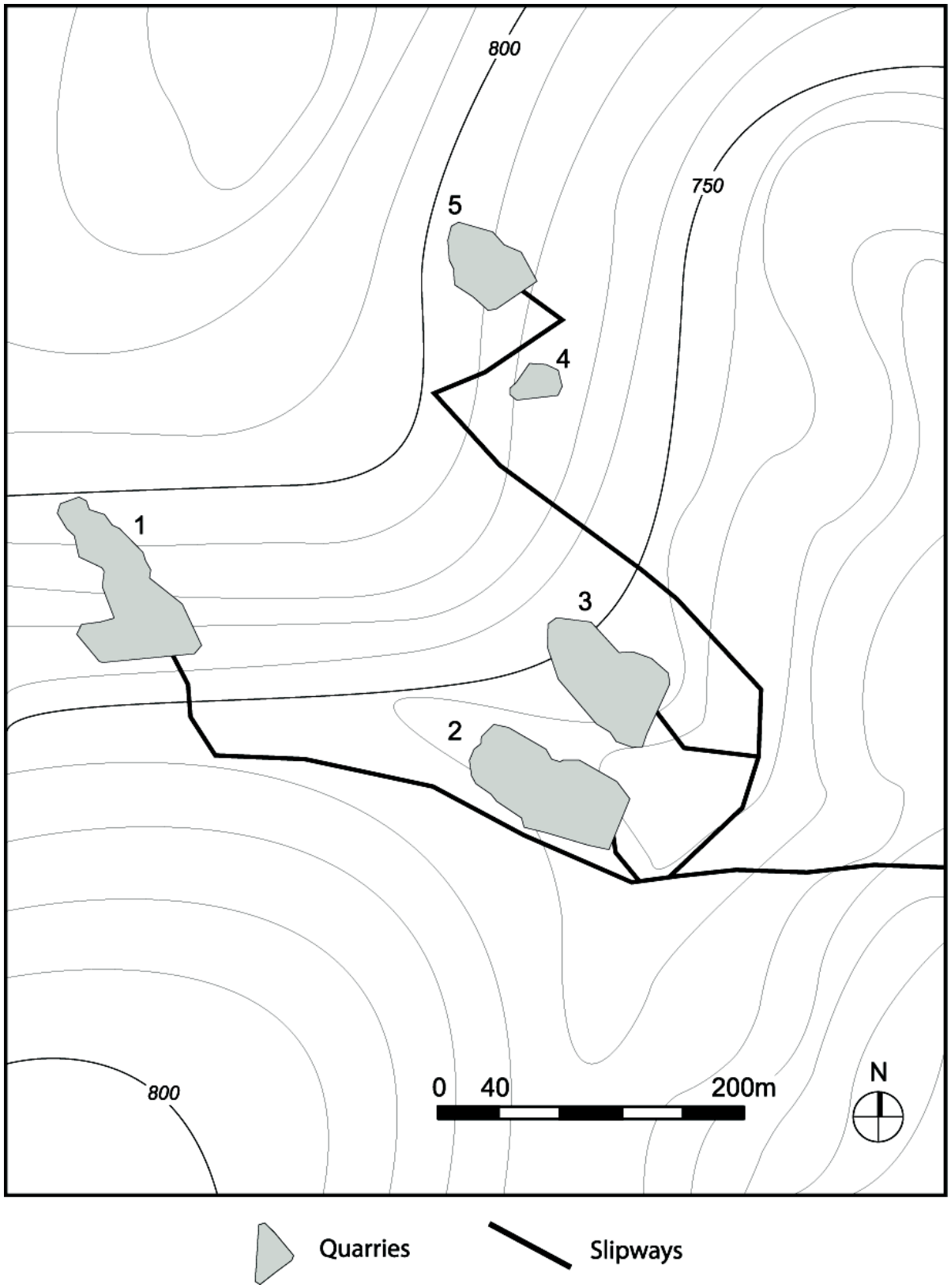
3.32. Results of current work compared to Gorgoni's (1998) global comparative diagram of medium-grained marbles.



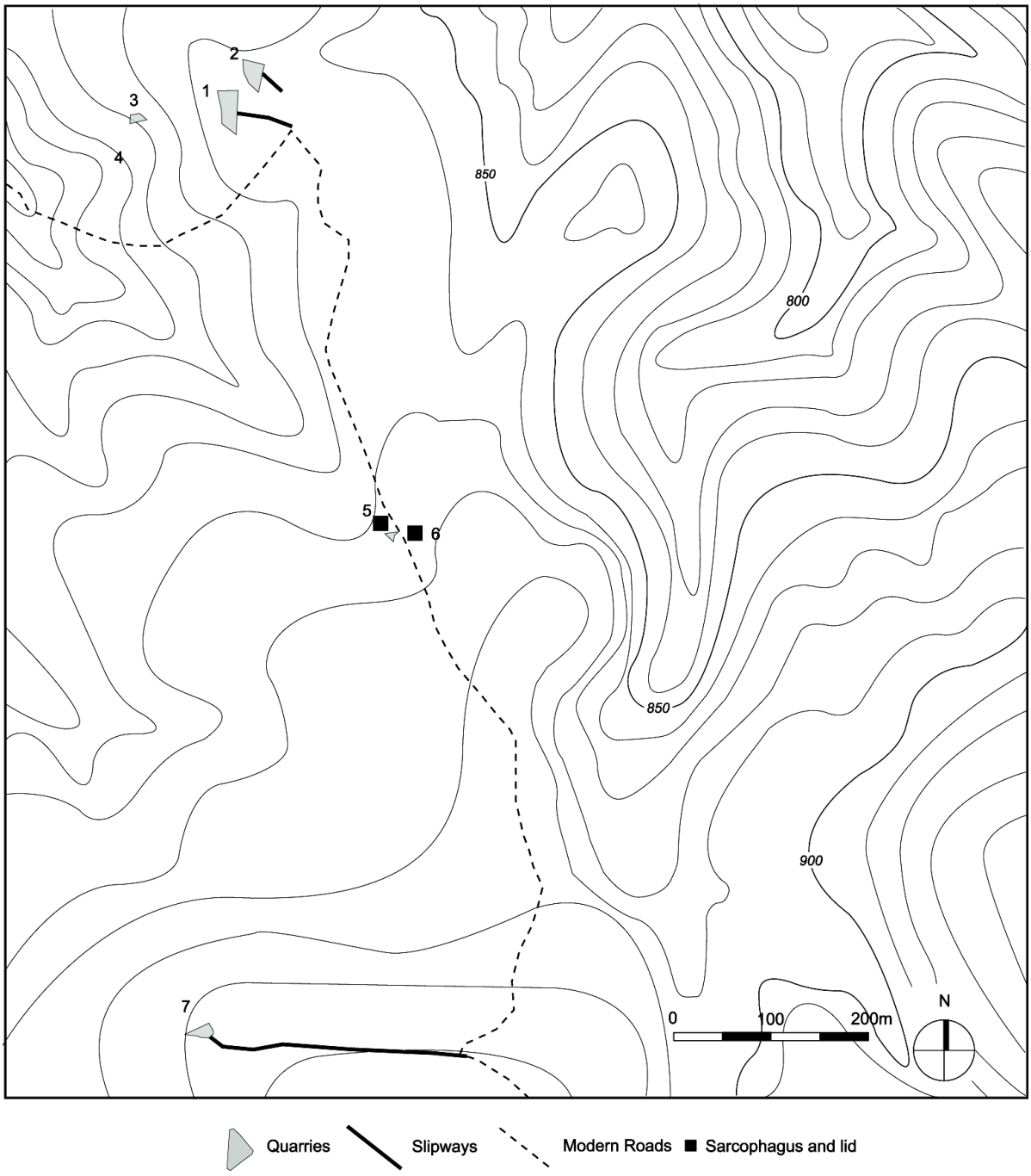
3.33. Plan of Yazır Quarry (1) (1:4,000).



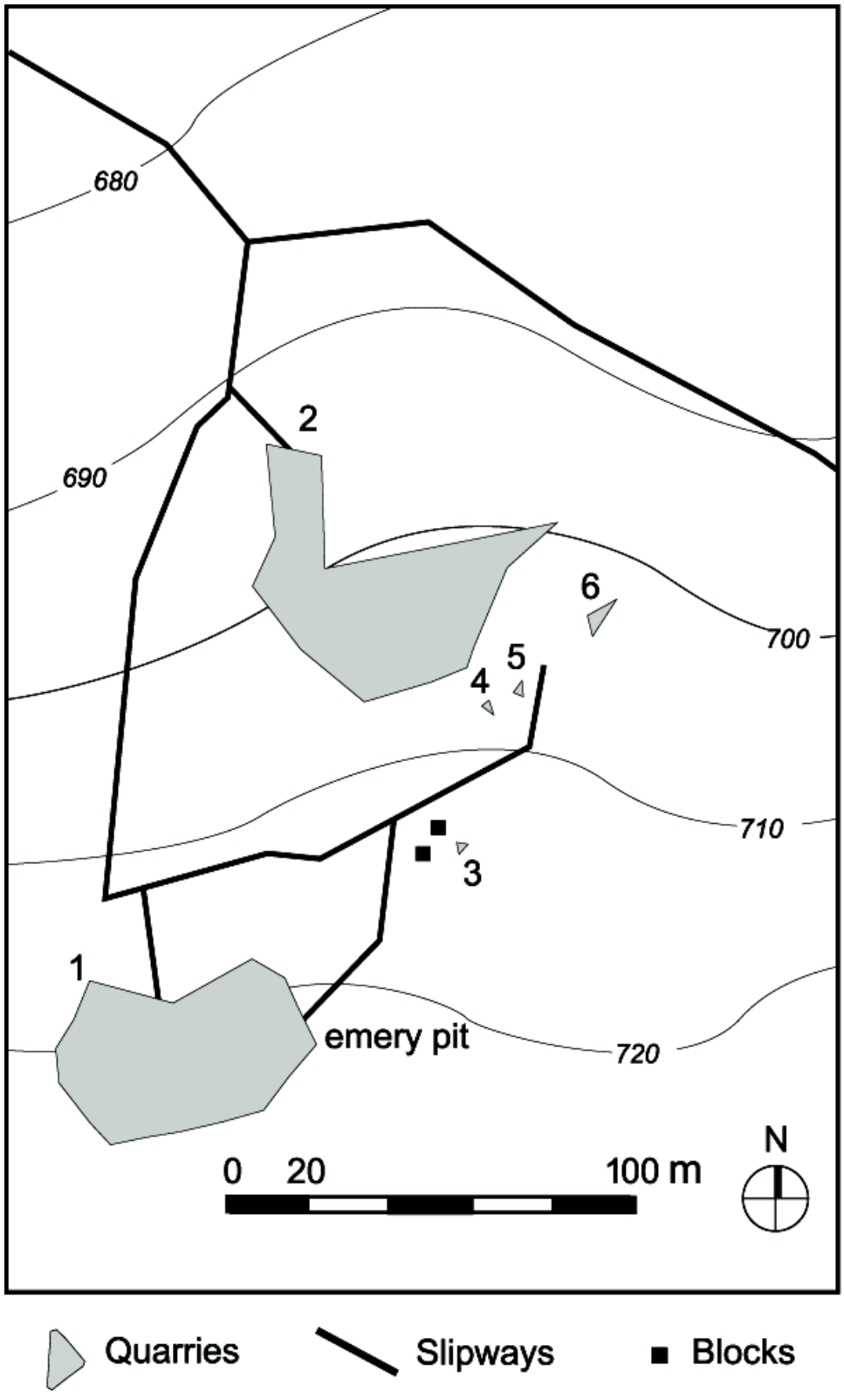
3.34. Plan of Ören Quarries (2) (1:10,000).



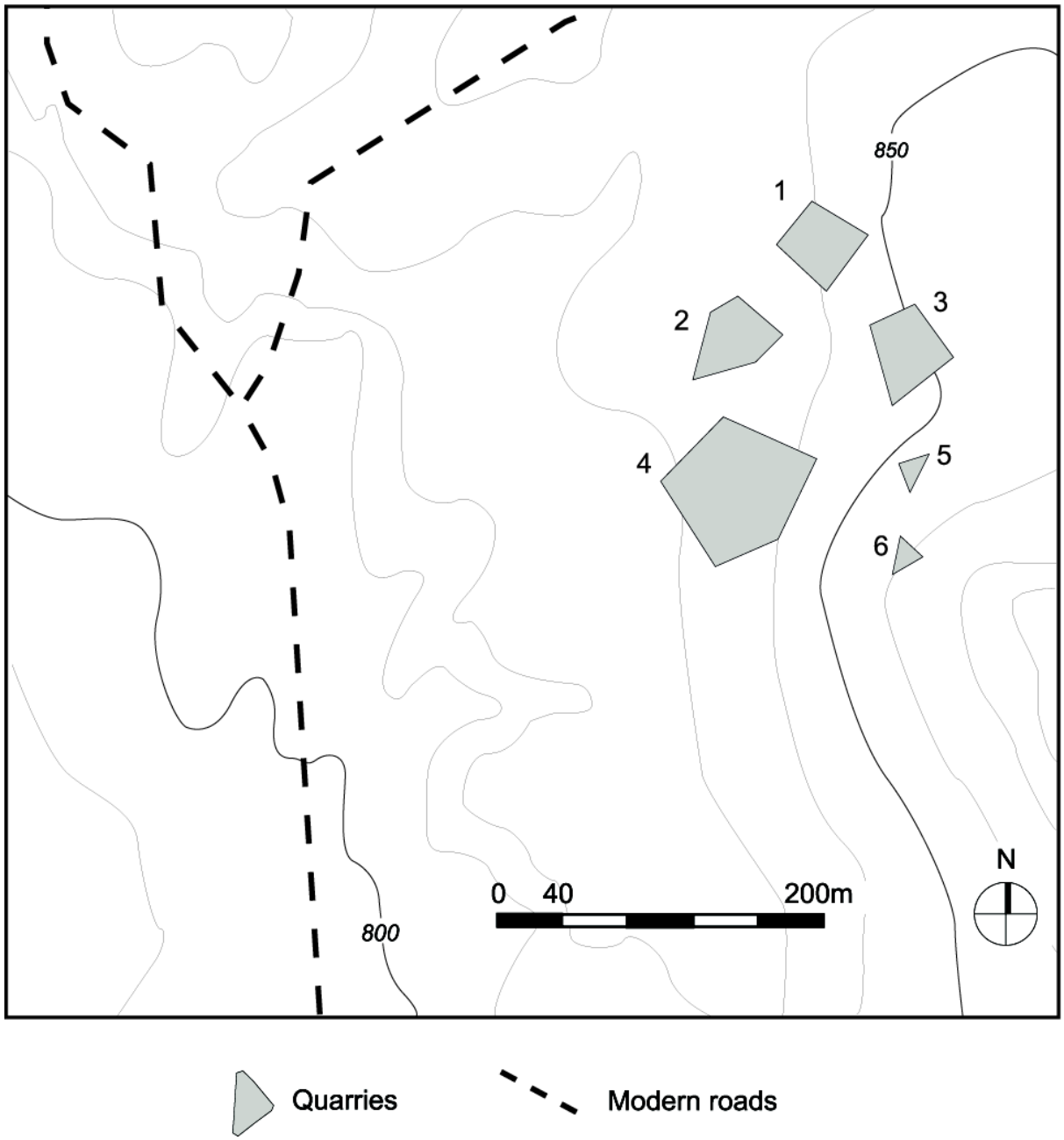
3.35. Plan of Hançam Quarries (3) (1:4,000).



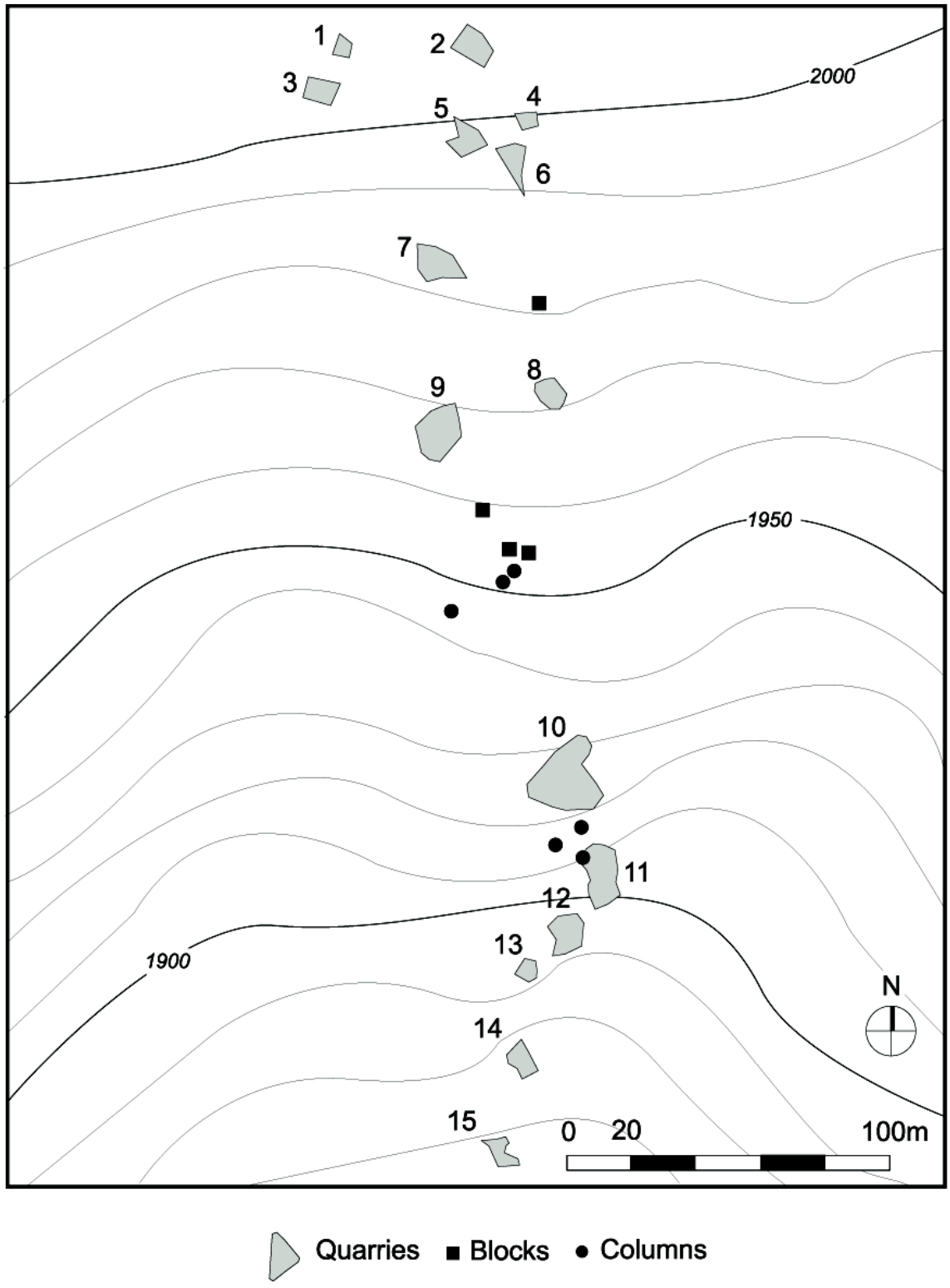
3.36. Plan of Çamarası Quarries (4) (1:8,000).



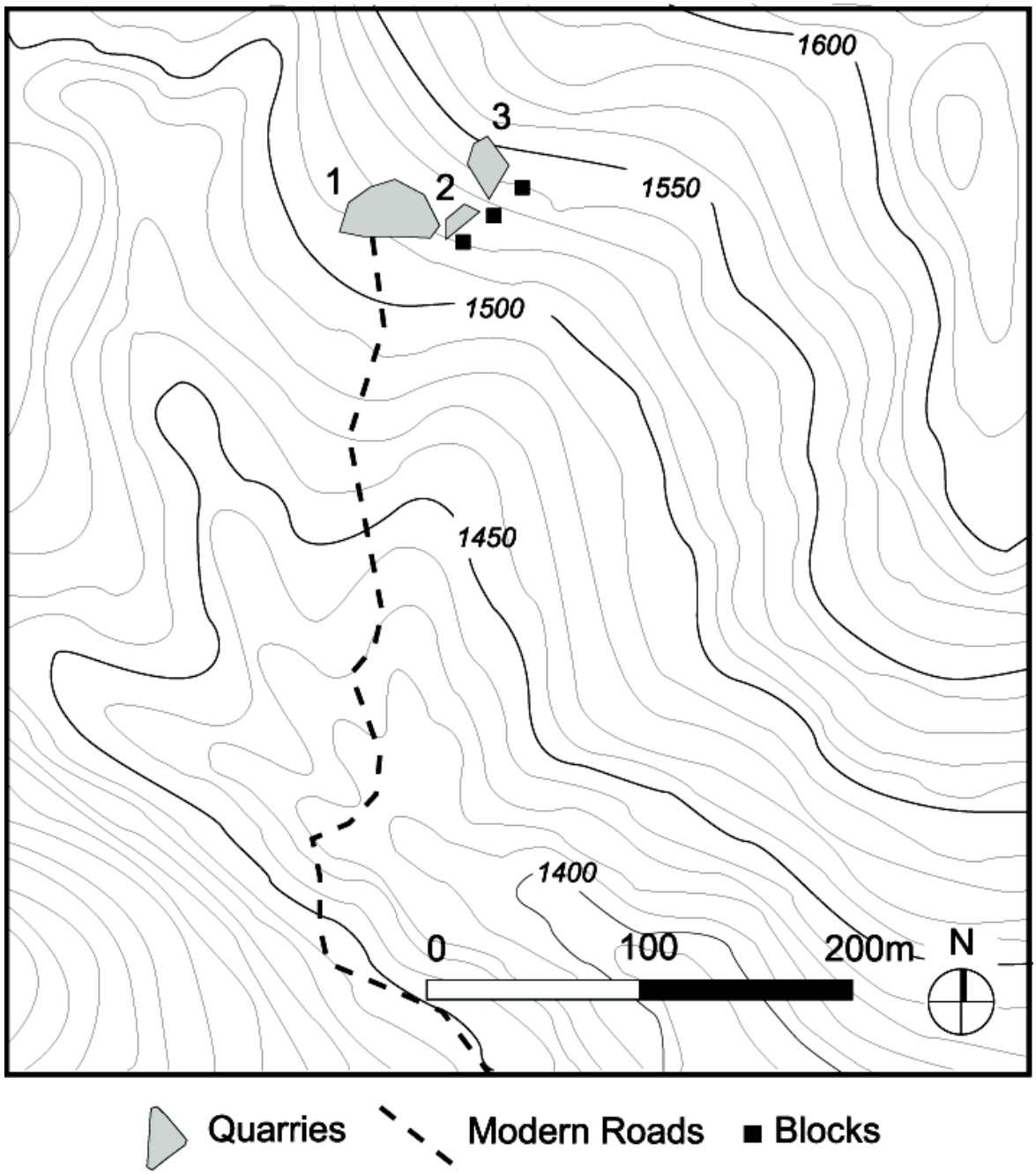
3.37. Plan of Kızıl Cağıl Quarries (5) (1:4,000).



3.38. Plan of Nargedik Quarries (6) (1:2,000).



3.39. Plan of Baba Dağı Quarries (7) (1:4,000).



3.40. Plan of Çamova Tepe Quarries (8) (1:4,000).